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Indexed in the Industrial Arts Index and the Engineering Index. Published every Thursday. Subscription Price United States, its Territories and Canada $8; other Western Hemisphere Countries $15; Foreign Countries $25 per year. Single copy, 35c. Annual Review Number, $2.00.

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Cable Address. "Ironage" N. Y.

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The IRON AGE

Vol. 163, No. 17 April 28, 1948

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News and Markets

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Sterling Devaluation

OUT of Europe since the end of the war have come persistent rumors of currency devaluation and a general revaluation of all currencies in terms of gold. Sterling has been the particular object of these stories and officials of the Labor government have found it necessary from time to time to deny them.

The subject is complex and its understanding has not been improved by the organization of the International Monetary Fund under the Bretton Woods Agreement. This fixed the ratios of exchange as of July 1, 1944, in the midst of a great war. Member countries may shift values up to 10 per cent. Beyond that they must consult the Fund. The penalties for infraction of Fund rules are vague.

There is no question but that the member countries are becoming restive under arbitrary exchange ratios which have little contact with the realities of currency values. It is not surprising perhaps that each country should conceive itself the victim of discrimination—a mathematical impossibility. The Progressive Conservative Party of Canada in its official platform calls for a new deal in exchange ratios and a free market for gold. France has already been denied the facilities of the Fund and South Africa feels its sovereignty infringed and its national interests injured by inflexible exchange rates and a fixed price for gold.

The resolution of this problem will be one of the most difficult to confront the postwar world. The truth is that there is no objective yardstick by which currency values may be measured and their values in terms of each other determined. In the absence of a free market for gold providing a common denominator for all currencies, their values rest upon considerations which cannot be measured precisely.

The domestic buying power of a currency is one of these considerations. How can that be measured and compared with other currencies? The trade balance of the country is another. Such balances may be favorable or otherwise, large or small. On what gage can they be rated? Finally, the budgetary practices, the monetary and credit structure of each country, as well as the degree of faith in the integrity of the government, are factors bearing on the value of a currency as elusive as they are variable.

We do not envy the position of the arbiter who may be called upon in the absence of a free gold denominator to determine these values. It will require the wisdom of a dozen Solomons, the integrity of archangels and the tact of a super diplomat to resolve this question. The demand for a solution has been deferred by an enormous flow of American dollars and by the extended boom of the postwar period.

As the sellers' market gives way to buyers who can pick and choose and bargain, international competitive success will depend on productive efficiency and labor costs. The latter have never been more rigid.

Statesmen dependent upon the favor of organized labor to retain power will seek increasingly to use currency depreciation as a competitive weapon. That will present a real test for the fantastic structure of exchange rates now resting on the sand of bureaucratic fiat. When English products back up in English ports because buyers have been able to make better deals elsewhere, then the question of sterling devaluation will no longer be academic.

Joseph Stagg Lawrence

► A new method of making roller bearing races is under development. The method involves cold upsetting. It is believed that the cold upset races, up to $1\frac{1}{2}$ in. diam, can be made to close tolerances so that subsequent grinding will clean up the part and will be all the machining necessary.

► An offshoot of the rising trend toward firm prices in many lines is increasing use of a contract escalation clause under which both parties split savings arising from cost reductions.

► Handicapped by short runs, and a large number of alloys, sizes and gages from adopting large scale melting and rolling techniques, the brass mill industry is turning to a greater use of continuous casting methods. A plant soon to be completed will produce square billets by this process which will permit longer coil production. Less mill shutdown time will be needed to feed in new coils.

► A steel specialty company which buys semifinished steel for further fabrication has been notified by its suppliers that it can now have all the semifinished it needs. This company reports that it is now "out soliciting orders."

► The trend of the auto industry to higher compression engines will require high test gasoline in increasing quantities. Current estimates place yearly consumption of lead for tetraethyl production at close to 200,000 tons by 1952, about half of U. S. mine production in 1948. This would be an increase of more than 100 pct above 1948 tetraethyl lead consumption.

► Analysis of hot-rolled sheet extras of six large steel companies shows six different prices for certain grades and sizes. Companies with the lowest prices are booking the heaviest tonnages. Within a very short time mills will be competitive on hot-rolled sheet and strip extras.

► Layoffs do not always make for increased worker efficiency. One reason is the high number of job transfers resulting from seniority agreements. In one large company job transfers outnumbered actual layoffs 6 to 1. Better productivity seems to have been achieved in the relatively rare instances when seniority was not the determining factor in layoffs.

► Use of high speed transfer type presses in the forming of drawers for electric ranges has boosted production from 100 to 300 finished parts an hour, reduced the number of presses and operators required from three to one and eliminated costly intermittent anneals and pickles between drawing operation. Through the use of a specially constructed die arrangement in this type press, rectangular drawers 6 in. deep are drawn in one op ration. Two draws were previously required.

► The proposed $210 million, 130 mile belt conveyer between Lake Erie and the Ohio River is the center of a growing fight. Twelve railroads and the combined brotherhoods appear to have killed legal permission for the line to operate--at least until 1951. The railroads say the belt should carry other things besides coal and ore. Belt backers answer that the conveyer would take only 2.5 pct of railroads' revenue. United Rubber Workers have entered the fray in defense of the project.

► While present magnesium fluxes are not designed for the temperatures encountered in producing nodular graphite cast iron, they do appear to increase the alloying efficiency when mixed with the magnesium alloy. Research is underway to develop satisfactory fluxes to reduce burning of magnesium when it is used to produce this type iron.

► Skin milling, used in machining certain aircraft wings in which the skin and structural components are integral, is purely an expedient and not deemed feasible for mass production. High machine costs, number of machines required, slowness of process and the fact that about 60 pct of the aluminum stock is cut away in the form of chips are reasons enough for wanting a more economical and faster method of forming.

► New metallic alloys are a must for advancement of modern high speed aircraft, according to designers and metallurgists in the field. Wind and rain blasts at supersonic speeds produce serious erosion, and the temperatures created by ram compression and air friction are such that serious diminution of strength and resistance occurs.

► In a bearing race turning job recently tooled, carbide tipped forming tools are used to groove the outer race at cutting speeds of 935 sfpm.

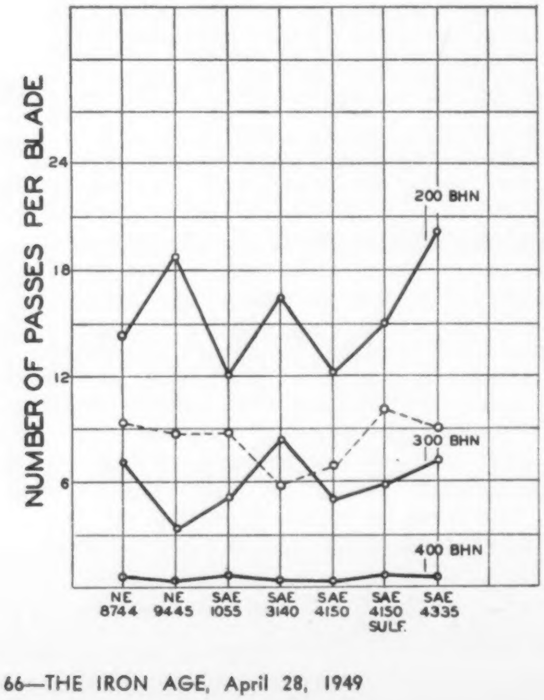
Hot Milling

MILLING HIGH STRENGTH ALLOYS AT

By A. O. SCHMIDT
Research Engineer,
Kearney & Trecker Corp.,
Milwaukee

NEW and improved high strength metals, together with large volume of output demanded by mass production requirements often make metal cutting in general, and milling in particular, a difficult operation. There are two ways of milling high strength material to obtain reasonable tool life. One involves reducing the cutting speed and feed and, if possible, cooling the cutter. The other involves increasing the cutting speed and feed, but preheating the workpiece.

Generally, the hardness and the strength properties of a steel workpiece can be taken as an approximate index of machinability. Steel of 200 Bhn may be cut efficiently with a carbide cutter at a cutting speed of 400 sfpm and a feed per

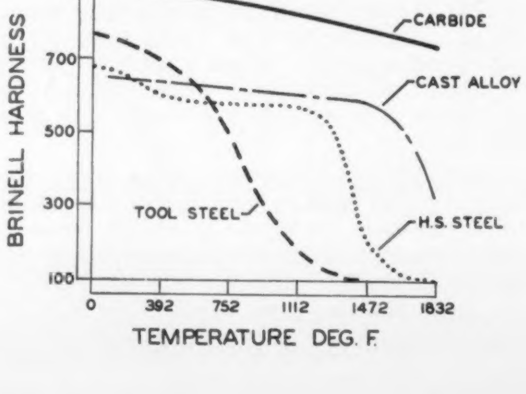


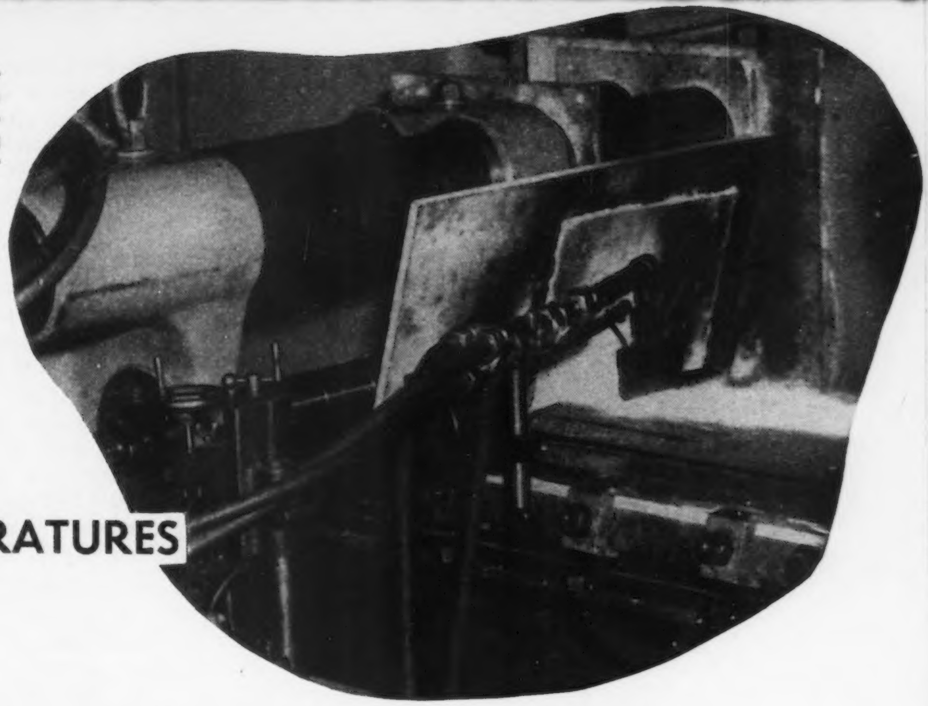
LEFT

FIG. 1—Average number of passes per carbide blade when milling steels of 200, 300 and 400 Bhn. The heavy lines indicate performance at a cutting speed of 428 sfpm and a feed of 0.0115 in. per tooth. The dotted line represents steels of 400 Bhn milled at a cutting speed of 130 sfpm and a feed of 0.0045 in. per tooth.

BELOW

FIG. 2—Effect of temperature upon the hardness of tool materials, based on data by E. Amman. Hardness of cast material was estimated by performance in hot milling.





EXPERIMENTAL setup for heating workpiece in hot milling, using oxy-acetylene torch and shielding machine parts with asbestos.

ELEVATED TEMPERATURES

Basic work that may open new fields in the art of cutting high strength metals involves heating the work to be machined to temperatures in the range of 1000° to 1500°F and machining at those temperatures. Data show definite reductions in power requirements, faster cutting speeds and feeds, and good tool life. The technique of hot milling, methods of application of heat to the workpiece, cutting speeds and feeds, and various other results of extensive investigations in this field are revealed for the first time in this article.

tooth of 0.010 in. The same material heat treated to 300 Bhn would require a reduction in cutting speed to about 300 sfpm and in feed to about 0.008 in. per tooth in order to obtain reasonable tool life. When the steel hardness is increased to 400 Bhn, the machining problem becomes more difficult. Not only is it necessary to decrease the cutting speed to about 140 sfpm and the feed to 0.004 in. per tooth, but the machine requirements become more stringent.

In fig. 1 are plotted the average number of passes per carbide blade when machining different steel test bars 12 in. long, heat treated to various hardnesses. The milling cutter operated at 428 sfpm cutting speed and a feed of 0.0115 in. per tooth. At this speed and feed the tool

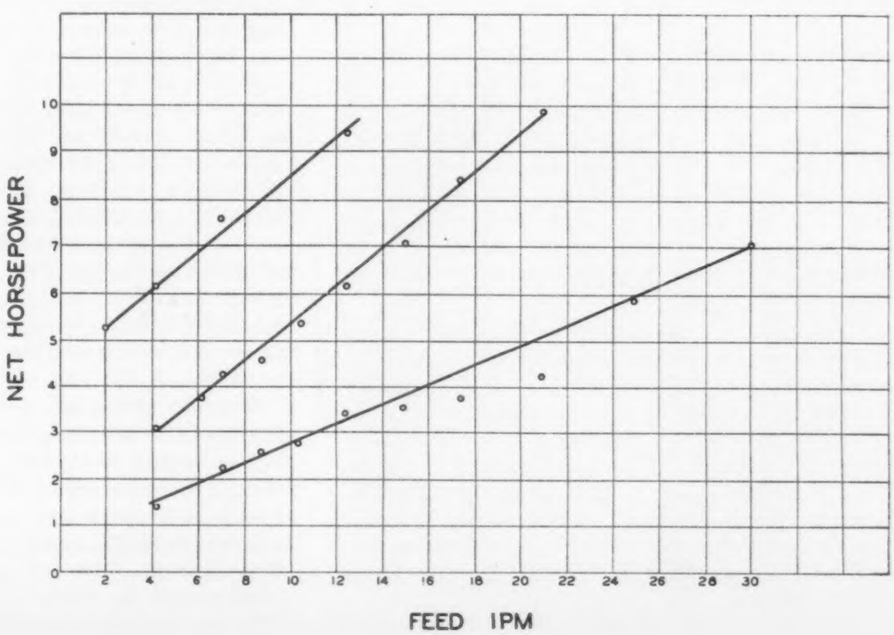


FIG. 3—Power required in milling a die block. The upper line indicates power to mill the block in "as received" condition. The lower line shows power requirements when the block was heated to about 1500°F. The center line indicates power requirements for milling the block after it had cooled again to room temperature.

FIG. 4—Milling cutter with solid sintered carbide teeth, as used in tests for milling heated die blocks. The rounded chip space in the hardened cutter body is chromium plated to facilitate unhampered chip flow.

materials more machinable is to cut them while they are at an elevated temperature, since hardness and strength properties are then reduced. This procedure is feasible in operations such as roughing out die forgings immediately after they have come from the forging die, or by preheating in a furnace in those cases in which the workpiece will be heat treated again.

When a number of old die blocks used in drop forging required resurfacing, the cutting speed for the carbide milling cutter had to be reduced to about 100 sfpm and the feed to 0.0035 in. per tooth. Only thus was it possible to obtain a satisfactory tool life of 12 passes, 24 in. long, 6 in. wide, and 0.250 in. deep with a 10-in. carbide cutter. At higher speeds and feeds the cutter would fail quite frequently after only one or two passes. The machine used in these tests was a Kearney & Trecker CSM bed type machine of high accuracy and rigidity.

The power requirements, as measured with a wattmeter, were very high. Another indication

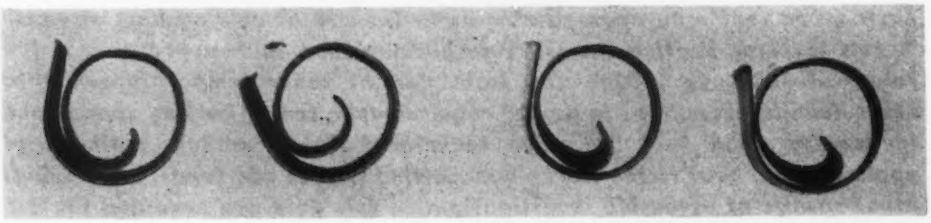


FIG. 5—Typical chips produced by the cutter shown in fig. 4.

life of the carbide blades was very low when milling test bars of 400 Bhn, but by decreasing the cutting speed to 130 sfpm and the feed to 0.0045 in. per tooth, better results were obtained. These are indicated by the dotted line in fig. 1.

The higher strength materials require more power per cubic inch of metal removed per minute, which also means that more heat is generated in the cutting operation. Sintered carbides and cast materials possess the property of keeping their hardness at elevated temperatures. This characteristic is shown in fig. 2.

When cutting SAE 1050 of 200 Bhn at 400 sfpm cutting speed, the temperature of the tool in the vicinity of the cutting edge will reach 1400°F after a few seconds, while the chips themselves will be about 760°F. All this heat is generated with the workpiece near room temperature.

Since, basically, the machine tool is the inverse of a heat engine and is supplied with mechanical power that generates heat in the tool, chip and workpiece, the less heat the machine tool is required to generate, the easier the metal cutting operation becomes. There are several ways to make machining easier, such as using materials having inherently good machinability properties as in light metals; additions to ferrous materials; heat treatment; and last, but not least, cutter design.

Another method of making steels and other

of the large amount of work required in this particular milling job was the high temperature of the chips, which would reach 1400°F, as determined by comparison of the chip color with a heat-color chart.

In further machining tests, one of the die blocks was heated in a furnace to 1800°F and then mounted in an insulated fixture on the milling machine table. The milling of this heated die block started when the block was at about 1500°F, as determined by comparison with a heat-color chart, and the temperature continued to drop slowly as the tests proceeded. The power required, measured with a wattmeter, is plotted as the lower line in fig. 3. After the block had cooled to room temperature its hardness on the surface had dropped from an average of 400 Bhn to 350 Bhn, which also reduced the power needed as indicated by the middle line in fig. 3. When the block was at room temperature in its original state, the power consumption was as shown by the upper line.

Because of the interrupted type of cut in milling, tool life is comparatively good when machining a heated workpiece, since the tooth has a chance to cool in the air between cuts. Changes in microstructure and accuracy in the workpiece are unavoidable under these conditions, but a difficult milling job can be made easier this way. Care should be taken to provide proper protection against the heat flow from the workpiece

into the machine, either by insulating with layers of asbestos or by circulating a coolant in the table or fixture.

Preheating the workpiece means that the cutter will not be required to generate as much heat in cutting as when the workpiece is at room temperature. Instead of heating the chip material from room temperature to about 1400°F by deformation, compression and friction attendant to normal cutting action, preheating the die block to the specified temperature will require a much smaller percentage of additional heat to be generated during the chip formation.

In tool-life tests on cutters with carbide tips, such as shown in fig. 4, the same number of passes were completed when milling heated workpieces at high feed rates as when milling the same workpieces at room temperature at only one-eighth the feed rate. Typical chip patterns are shown in fig. 5, produced by the cutter shown in fig. 4 when used to machine the heated die block.

Although the workpieces used in the above tests were heated in the furnace, preheating on the milling machine itself is feasible and will permit increased feed rates for optimum production.

1200°F. This softened the material and cushioned the shock when the milling cutter tooth entered the work. The temperature of the work surface at the point of engagement with the cutter, several inches away from the torch, was about 1100°F. In addition, the power requirements were reduced as can be seen in the graphs, figs. 8 and 9.

There was no discoloration or temper color on the milled surface, indicating that temperatures in the workpiece were below 350°F during the cut. A microscopic examination revealed no difference between the microstructure of a piece machined at room temperature and one machined with a preheated surface.

These numerous tests conducted with the workpieces heated on the milling machine with an oxyacetylene torch indicate that, because of reduced power consumption, milling is possible at greatly increased feeds. Higher production would justify the additional expense incurred in preheating the workpiece.

When applying heat on the top surface of the workpiece, it was possible to control the heating in such a way that the impact blow between the cutter and work was reduced, the horsepower

LEFT

FIG. 6—Bed-type milling machine used for slab-milling tests. Preheating the workpiece is done with an Airco flat surface torch, while the cutter and spindle are shielded by an asbestos plate. K&T Photo by H. W. Francke.

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BELOW

FIG. 7—Milling the preheated workpiece of SAE 4340 steel, 280 Bhn, with an eight-toothed Tantung slab mill. Cutting speed, 236 sfpm; depth of cut, 0.200 in.; width of cut, 4 in.; feed, 60 ipm; metal removal rate, 48 cu in. per min; power required, 35 hp. K&T Photo by H. W. Francke.

A large number of slab milling tests was conducted on a Kearney & Trecker 1808 CSM Simplex Machine. The cutter used was a Goddard & Goddard slab milling cutter 5 in. diam x 4 in. wide with eight teeth tipped with Tantung. The workpiece was a flat steel plate of SAE 4340, 280 Bhn, with the surface preheated by an Airco flat surface torch, 3½ in. wide, and water cooled, as shown in fig. 6. The workpiece, chamfered at the sides, was held in the fixture by clamps acting on the chamfered surfaces. The workpiece, spindle, cutter and heat baffles can be seen in fig. 7. Pieces of asbestos board were used for insulation and for shielding the cutter and spindle nose. Before the table feed was engaged, the torch was lighted and the flame adjusted while the spindle was running. Feeds used in these tests were 50 and 60 ipm with a spindle speed of 180 rpm, equivalent to 236 sfpm cutting speed.

The heat supplied by the torch was sufficient to heat the surface of the workpiece to around

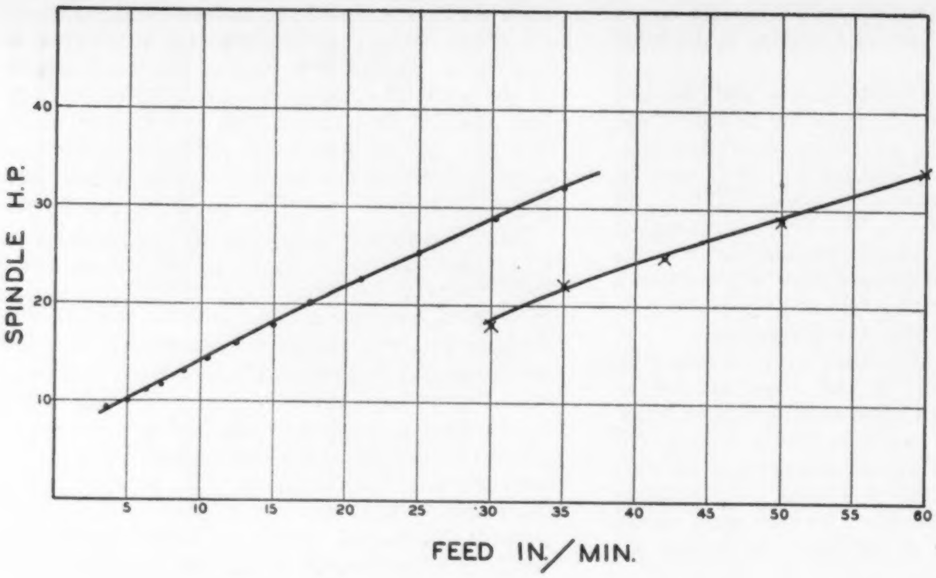


FIG. 8 — Spindle horsepower in relation to feed of milling machine shown in figs. 6 and 7. The lower line is for the preheated workpiece; the upper line is for the workpiece milled at room temperature. Depth of cut, 0.200 in.

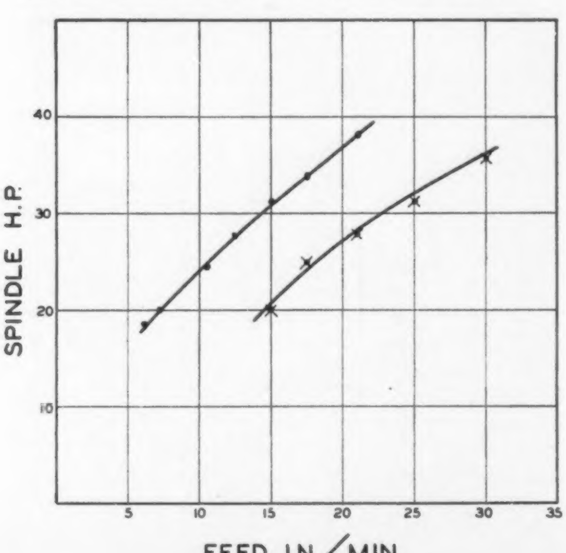
consumption lowered, and the rate of feed increased so that practically all of the heated material was cut out or removed in the form of chips. The workpiece and cutter were not too warm to be touched by hand immediately after the cut and no noticeable distortion of the workpiece could be detected.

As can be seen in fig. 2, carbide remains comparatively hard at high temperatures and will therefore mill a heated workpiece under conditions that will cause a high speed steel cutter to fail almost immediately. Many tests were also run with cutters having teeth of cast material. Judging by the good performance of cast materials, their hardness when milling a heated steel piece will follow the line indicated in fig. 2. Cast alloys prove to be satisfactory tool materials for use in hot milling.

Heating a steel workpiece will decrease the power requirements appreciably. Combined with intermittent cutting, an inherent characteristic of milling that results in cutter-workpiece contact only part of the time, this practice yields good tool life. Carbides and cast alloys are suitable tool materials having the desired properties at elevated temperatures, that is, they remain harder than the material they are cutting and can thus function as metal cutting tools. Cutters must be designed for good chip flow and immediate ejection of the chip to avoid unnecessary accumulation of heat in the cutter.

Hot milling, or milling a workpiece whose surface layer has been softened by the application of heat, quite obviously is not indicated as a desirable machining method when other, more established, procedures prove expedient. Application of this technique is at present limited to operations that cannot be performed practically or economically by the more common methods.

FIG. 9—Spindle horsepower in relation to feed of milling machine shown in figs. 6 and 7. The lower line is for the preheated workpiece; the upper line covers the workpiece at room temperature. Depth of cut, 0.380 in.



Acknowledgment

Acknowledgment is made to Russel F. Stuart of Walker-Turner Div. and J. B. Armitage and J. R. Roubik of Kearney & Trecker Corp. for encouragement and help in the tests reported herein.

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Welding Increases Bobbin Capacity

BY increasing the amount of thread per bobbin by increasing the bobbin size of its textile machines, the Lehigh Valley Throwing Mills, at Bethlehem, Pa., realized that handling operations would be materially decreased. It was desirable to increase the bobbin size to handle 8 oz of thread instead of 3½ oz.

To make this change, the cork-covered, cast iron rolls and the cast iron shaft hangers had to be extended to accept the larger size bobbin. To replace existing rolls and hangers with new ones would cost a considerable sum, and the problem was in how to utilize the old rolls and hangers. This problem was solved by arc welding.

In the case of the cast iron shaft hangers, there was no difficulty. Each shaft hanger was cut in two and an extra piece of cast iron of prescribed length and cross section was inserted and welded into place. This work was done in a special fixture, shown in fig. 1.

The rolls presented a more difficult problem. While it was comparatively simple to weld the necessary extension to one end of the rolls, the surface had to be absolutely smooth because the rolls must be covered with a layer of cork. This indicated that easily machinable welds were necessary since the welded area had to be machined to take the cork.

FIG. 1—Extending a shaft hanger in a specially-designed jig.

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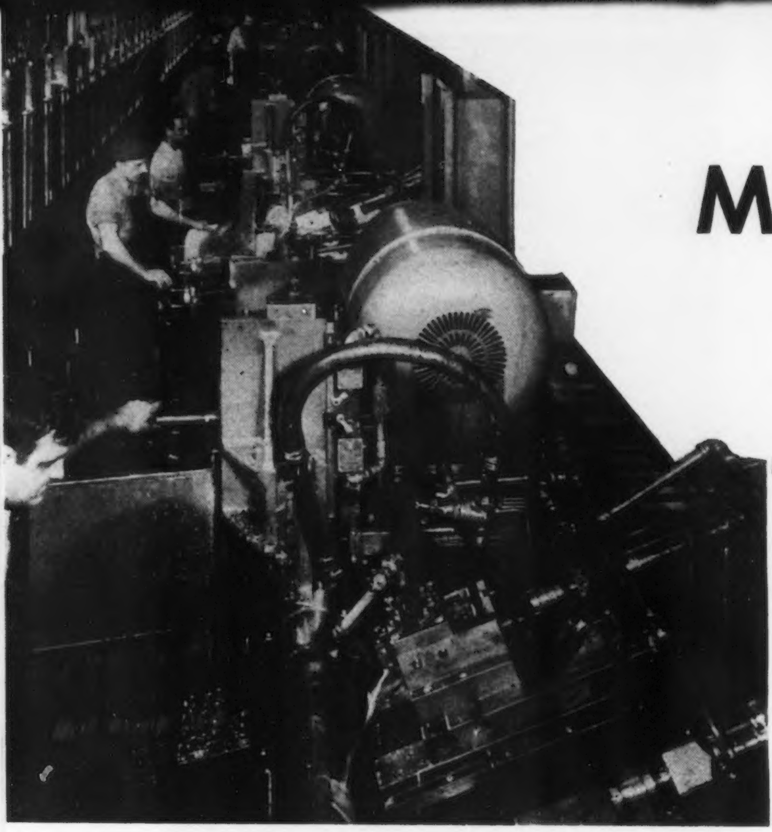
After some experimentation, Airco 375 electrodes were tried. These electrodes, manufactured to produce machinable welds in cast iron, provided the answer. The operation of welding, shown in fig. 2, is a comparatively simple one, and the work of making the desired changeover is progressing. Some 35,000 rolls and 2450 shaft hangers are being extended to take the additional thread, at a cost saving of about 50 pct of the price of new rolls and hangers. A bank of the larger rolls is shown in fig. 3.

ABOVE

FIG. 2—The operator here is welding the extension to one of the cast iron rolls.

RIGHT

FIG. 3—Cork-covered, cast iron rolls installed. The bobbin rides on the roll. The purpose of the roll is to drive the bobbin and to provide constant tension and linear feed of thread upon the bobbin.



Several of the 11 axle turning machines at the Ford Rouge plant are shown here. Machining speeds for this part range up to 830 sfpm and the job is completely carbide tooled. ○ ○ ○

Machining Axles at

By THOMAS E. LLOYD
Machinery Editor,
The Iron Age

PROBABLY the highest speed turning job of its kind is the multiple diameter turning of heat treated alloy steel axle forgings for Ford automobiles. In 11 special hydraulic feed lathes, designed and built by the Snyder Tool & Engineering Co, Detroit, and equipped with solid carbide insert cutting tools mechanically clamped in special holders, designed by Kennametal, Inc., Latrobe, Pa., and Wesson Co., Detroit, turning, facing, chamfering and grooving cuts are taken on seven different diameters at speeds up to 830 sfpm. All diameters and faces are finished to size in one machine cycle with the exception of the bearing diameter, which is subsequently ground.

Production rates are controlled mainly by the operator, tool and tool holder life, and tool setup time. Present average output is 61 axles per hr per machine. Actual machine cycle time is 29 sec and, assuming a loading time of 10 sec as a fair estimate, floor to floor time is 39 sec, or a potential gross production rate of 92.2 pieces per hr. Average hourly output is rising as the factors controlling it increase in efficiency.

The axle as received in the machine is a hardened rough forging with a thin circular flange at one end, and it is previously faced to length and centered at both ends. The flange, after machining, measures 6.340 in. diam by 0.31 in. thick, while the remaining turned areas vary in diameter from 1.242 to 2.430 in. The axle is heat treated to a hardness of 30 to 38 Rc up to the flange. The flange is not quenched, and has a hardness of about half that of the remainder of the part. The fact that the flange is not hardened favors the high machining speeds, since this softer portion is machined at the higher cutting speed, because of its diameter.

The machine designed for this axle turning job is the result of close cooperation between the machine tool builder, the cutting tool manufacturer and Ford Motor Co. To obviate the necessity of a center drive machine with its problems of loading, or of dividing the work into two or more operations, Ford processing and purchasing engineers obtained a part design change incorporating a forged-in driving slot in the flange end of the forging. This permits the part to be held between centers and driven by a floating driver carried on the head stock spindle, leaving open for machining all diameters and faces that require finishing. Snyder and Kennametal engineers, working together, made a new approach to the problem of supplying equipment best suited to Ford's requirements.

The usual procedure in tooling a job is to take a machine of existing design and adapt tooling to it which will perform the desired operations as well as fit on the machine. In this case, the first step was to layout what seemed to be the best possible tool for each cut, employing the most advanced ideas in solid carbide inserts of various shapes, mechanically clamped-in heavy duty tool holders. Then a machine was designed with sufficient weight and rigidity to take full-

s at Ford

—at speeds up to 830 sfpm

How fast can hardened steel be turned with carbides while still maintaining good tool life? Ford Motor Co. is seeking that answer and has raised cutting speeds to 830 sfpm with good tool life in machining some details of a hardened steel axle. Still higher speeds are being tested. Machine and tooling details as well as operating data on this unusual lathe job are described in this article.

est advantage of the extremely high cutting speeds and feeds possible with this type of tooling.

The result is a machine weighing in excess of $9\frac{1}{2}$ tons and equipped with a motor driven head stock, two front turning carriages, two back facing slides, one overhead facing slide and a hydraulically operated quill type tailstock. All carriages and slides are hydraulically fed, the rate of feed of each being controlled independently

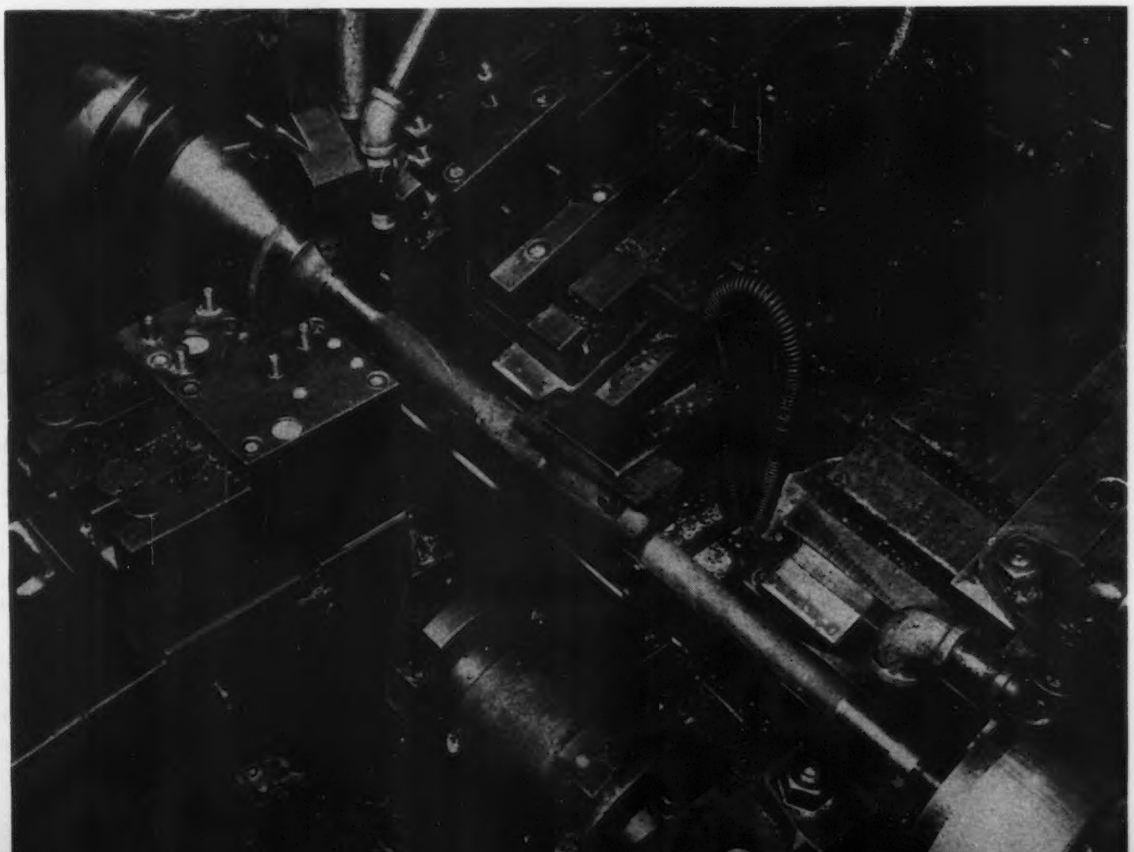


FIG. 1 — Massive tool slides position tools firmly for the heavy cuts required. All main tool slides are shown here and the overhead facing slide is shown directly over the flange of the axle in the machine.

the tail center is held in the work under 300 lb pressure from this cylinder.

The problem of disposing of the large quantity of chips produced by the heavy cuts and high speed machining was solved by designing a chip chute into the base. This chute sheds the chips and coolant directly into a chip drag supplied by the Ford Motor Co. This chip disposal system is shown in fig. 2.

The tooling as originally set up for the job is shown at the top of fig. 3 and employed a spindle speed of 350 rpm with a turning feed of 0.032 in. per revolution and a facing feed of 0.025 in. per revolution. All tool holders were of the split type, securing the carbide inserts with pinch bolts and backing up their under end with jack screws. While this setup was fairly effective, unforeseen problems arose when the machines were installed and sustained production attempted at the Ford plant.

Working under the direction of the carbides committee of the Ford Motor Co. with the cooperation of Kennametal and Snyder engineers

FIG. 2—Chips fall into a chip chute in the base of the machine and are washed by the coolant into the chip drag for disposal. This chip drag serves several machines and the coolant is recovered for reuse.

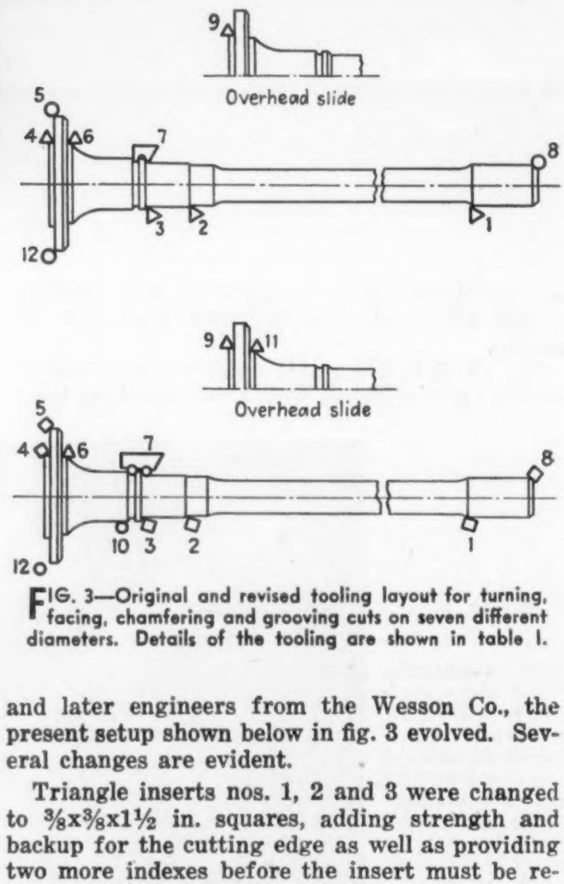


FIG. 3—Original and revised tooling layout for turning, facing, chamfering and grooving cuts on seven different diameters. Details of the tooling are shown in table I.

by dial type feed valves. The feed rates range from zero to 20 ipm, with heavier feeds being available by simply changing the spool in any valve.

The drive to the spindle is by multiple V-belt from a 30 hp motor mounted on an adjustable plate on top of the headstock through a duplex multiple disk clutch and gearing. All shafts and gearing in the head are made of heat treated alloy steel, all shafts are carried on preloaded taper roller bearings, and all gears are made with finish shaved, helical teeth for smooth and quiet power transmission. Easily accessible pickoff gears provide for speed changes. The headstock is designed to transmit up to 50 hp should it be required.

The slides are constructed to afford a rigid mounting for the massive tool blocks that secure the tool holders in their correct positions for the various cuts. Typical are the back slides which can be seen in fig. 1. They are 30 in. long x 12 in. wide, secured by a dovetail 2 in. deep that is fitted with a taper gib for its full length. All bearing surfaces are hardened and ground steel and automatically pressure lubricated.

The tailstock quill that carries the taper roller bearing mounted spindle for the tail center is 7 in. diam and advances and retracts by a hydraulic cylinder for loading. During the cut,

and later engineers from the Wesson Co., the present setup shown below in fig. 3 evolved. Several changes are evident.

Triangle inserts nos. 1, 2 and 3 were changed to ⅜x⅜x1½ in. squares, adding strength and backup for the cutting edge as well as providing two more indexes before the insert must be removed for grinding. Triangle insert no. 4, used in rough facing the outside of the flange, was changed to a ⅜x⅜x1½ in. square set at a 30° lead angle. This increased tool life and provided a simple means of chamfering the end of the pilot diameter, an operation that had been previously omitted.

As considerable breakage was experienced in the formed insert, no. 7, that machined the groove and faced the shoulder at the bearing diameter, an engineering change in the part print was ob-

tained, allowing the addition of $\frac{1}{2}$x$1\frac{1}{2}$ in. round insert, no. 10, which removes the scale and any out-of-round condition in the forging before the grooving tool makes contact. Because the solid carbide mechanically clamped form tool was expensive, various brazed carbide formed tips were tried without much success until the present tool, developed by the Wesson Co, was put into use. This consists of a formed steel subholder machined with two vertical grooves. Two standard round carbide inserts are brazed into the grooves, one for the grooving cut, the other for facing.

Round inserts nos. 5 and 8 for chamfering were replaced by $\frac{3}{8}$x$\frac{3}{8}$x$1\frac{1}{2}$ in. squares, as the rounded chamfers were not acceptable. Triangle insert no. 11 was added to the overarm tool slide, taking a finish cut on the inside face of the flange, and reducing the excessive amount of stock that previously had to be removed by triangle tool no. 6. Tool functions, shown in fig. 3, are described in table I.

At the original speeds and feeds, considerable tool breakage was encountered and, because of excess tool pressure, the long slender part tended to bow away from the tools, producing tapered diameters on the turned portions. While this tapering could be corrected by shimming the cams controlling the path of turning tool travel. the excess pressure set up vibrations that seemed to be the cause of tool breakage. As the broken cutting tools seldom showed great wear on the cutting edges, it indicated that more speed might be the answer.

To determine what might be the top optimum speed for doing the job, the Ford carbides committee instituted a series of experiments with interesting results. At first, as speeds were gradually increased over those generally recommended as standard practice, tool life became worse. However, at a point well above normal speeds, tool life began to improve and at a spindle speed of 530 rpm, tool life appeared to be better than at any other speed. As speeds were further increased, tool life again fell off, and at 600 rpm was very bad.

It is believed, however, that with certain changes in tool setup, such as modifications of tool angles and changes in coolant composition, further increases in spindle speed may see the trend toward shorter tool life reverse itself and become even better than at present. Inasmuch as the machine is rigid and strong enough to take these speeds, experiments are now in progress.

At the present 530 rpm spindle speed, Kennametal K3H, the carbide first tried, did not hold up. A harder grade, either Kennametal K4H or Wesson Metal WH, is now being used with excellent results. The work is being done now with a feed of 0.027 in. per revolution with depth of cut ranging from 3/32 to $\frac{1}{8}$ in.

Tool life, carbide specification and chip breaker sizes are listed in table I, along with

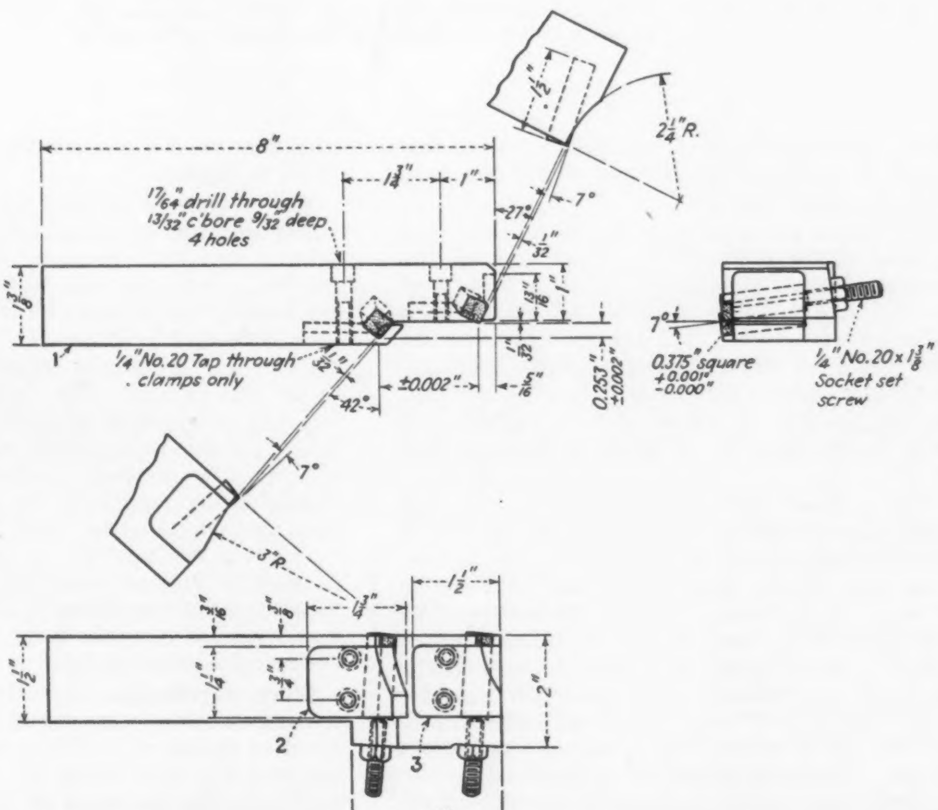


FIG. 4—The new type tool holder developed especially for this job holds two carbide inserts for rough facing the outside of the axle flange and chamfering its OD, shown as tools 4 and 5 in the revised tooling layout of fig. 3.

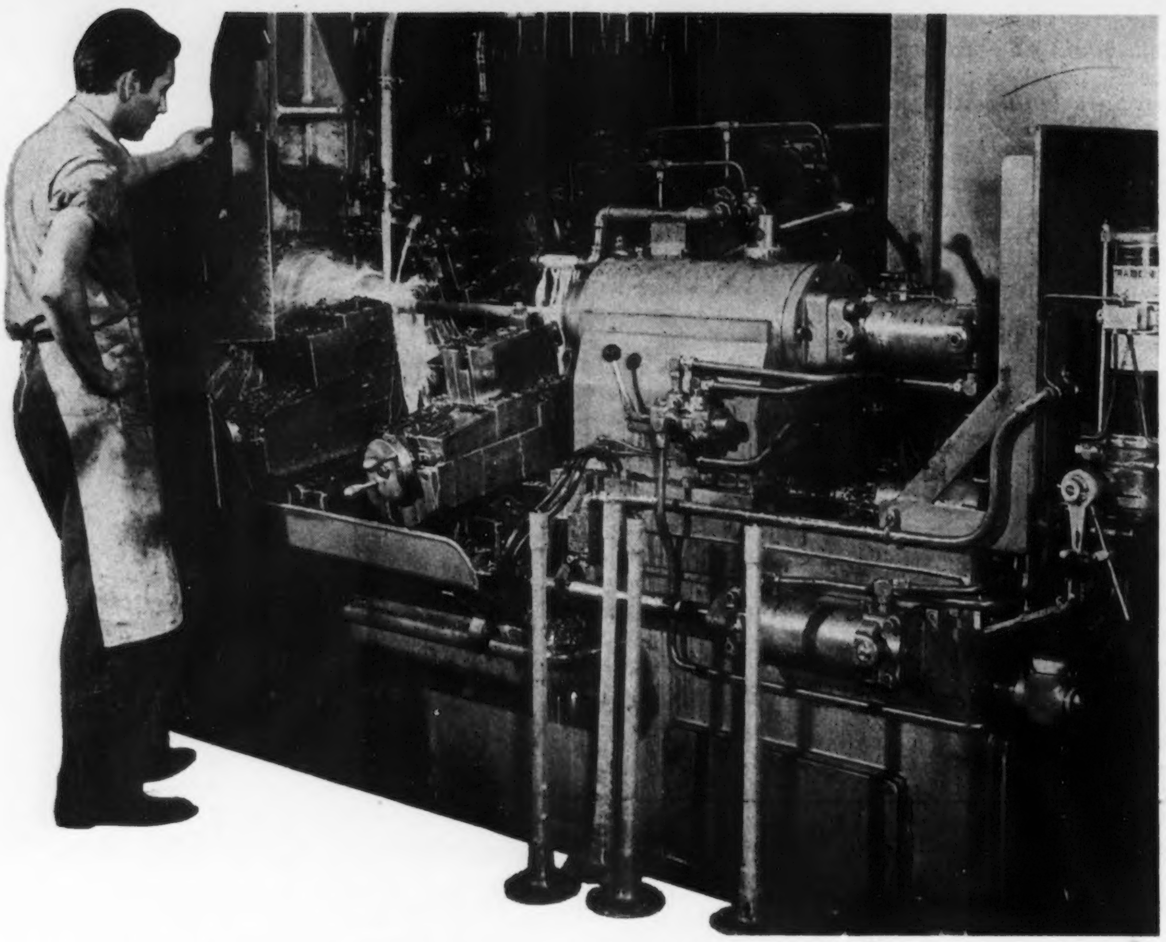


FIG. 5—Coolant delivery, as well as the operating setup of the machine, are shown here. Coolant delivery methods are being closely examined in the light of higher cutting speeds.

feed, speed and depth of cut data correlated into speeds in surface feet per minute for the various axle diameters.

Split type tool holders, in use since the introduction of the solid carbide insert type of tool, proved adequate at ordinary speeds. It was found at high speeds, however, chips and fine particles of scale were forced into the split between the insert and the holder causing continual breakage, the holders lasting only a day or two. A new type holder, designed by the Wesson Co., Detroit, is now in use and has eliminated much of this problem.

Fig. 4 shows a two-tool holder used for rough facing the outside of the flange and chamfering the OD of the flange. It consists of a heat treated alloy steel shank (detail one), machined out to hold two $\frac{3}{8}$ in. square x $1\frac{1}{2}$ in. long inserts. Two hardened steel clamp plates (details two and three), secure the inserts in place. The shank is machined to position the inserts with a double negative rake of 7° and is equipped with two jack screws for locating the inserts to the correct height. The clamp plates are designed so that all wear from the chips is thrown on them, protecting the relatively expensive shank from damage and the necessity of replacement. Because of their hardness the clamp plates have a fairly long life and, when necessary, they are a simple detail to replace.

The problem of coolants is being given considerable attention by Ford Motor Co., because it is being found that as machining speeds increase sharply, commonly used feeding techniques are inadequate. On these axle turning machines, the back slide that positions the tools that machine the flange is drilled for transmitting the coolant to the cutting area. The coolant comes through the tool slide, thus avoiding the necessity of flooding at this point. Other tools on the machine are cooled by flooding, as shown in fig. 5. One method being considered by Ford is to drill a hole through the tool block itself and run the fluid to the tool tip through this hole. One point emphasized by Ford engineers is that the coolant delivery technique should be considered as an integral part of machine design and not placed on the machine after it is set up and ready for use.

When experiments were being made on increased machining speeds, an unusual but highly effective means of checking power requirements and tool life was developed. An ammeter was placed on the headstock of the machine, wired directly to the motor. As the front tool slide contacted the work, about 25 amp were drawn. As the back slide came in, the amperage draw in-

TABLE I

Tooling Details for High Speed Axle Turning at Ford Motor Co.

Tool No.	Operation	Pieces Per Tool Index	Carbide Size Specifications, In.	Chip Breaker Parallel to Cutting Edge, In.	Diameter of Detail Machined, In.	Cutting Speed, Sfpm	Tolerances,* In.
1	Turn Spline Diam.	300	3/8 Square x 1½ Long	5/64	1.242	170	0.002
2	Turn Oil Seal Diam.	300	3/8 Square x1½ Long	5/64	1.522	230	0.004
3	Turn Bearing Diam.	300	3/8 Square x 1½ Long	5/64	1.532	230	0.004
4	Rough Face Outside of Flange and Chamfer Pilot	175	3/8 Square x 1½ Long	5/64	6.340 to 2.430	830 to 340	.....
5	Chamfer OD Flange	700	3/8 Square x 1½ Long	None	6.340	830	.....
6	Rough Face Inside of Flange	100	3/8 Triangle x 1½ Long	1/16	6.340 to 3.250	830 to 460	.....
7	Groove and Face Bearing	No Index	Two Rounds Brazed in		1.810	270	
	Shoulder	400 Per Grind	Formed Special Subholder	None	1.532	230	.....
8	Chamfer Spline End	700	3/8 Square x 1½ Long	None	1.242	170	.....
9	Finish Face Outside of Flange and Finish Pilot Diam.	250	3/8 Triangle x 1½ Long	1/16	6.340 to 2.430	830 to 340	0.003
10	Turn to Clean Up for Grooving Operation	200	3/8 Round x 1½ Long	None	1.810	270	.....
11	Finish Face Inside of Flange	250	3/8 Triangle x 1½ Long	1/16	6.340 to 3.250	830 to 460	.....
12	Turn OD of Flange	200	3/8 Round x 1½ Long	None	6.34	830	±0.010

* Pilot, bearing and spline diameters must be concentric within 0.003 in. total indicator reading. Outside of flange must run within 0.005 in. total indicator reading with these diameters.

creased 20 to 35 amp, bringing the total to 45 to 60 amp. These slides then retract and the overarm engages the work, drawing about 10 amp.

By watching the ammeter, the operator could tell when the job was operating normally. As a tool dulled, amperage increased and the operator could immediately spot the dull tool. In a normal cycle, when tool wear amounted to about 0.0030 in. on the cutting edge, this fact could readily be established, because as the tool dulls, pressure is increased and more power is pulled. This method helped reduce tool breakage and scrapped parts. The latter saving came as a result of the fact that as the tool dulls, the pressure increases and causes increased runout. Since subsequent grinding has been virtually eliminated, too much runout knocks tolerances out of line on the flange.

The use of the ammeter also helped in developing adequate tool grinds, since the ammeter permitted comparison of specific grinding methods. Just such a question arose and three different methods of grinding the tools were checked on the job and the best was readily recognized. If the stock cut varies in diameter, the ammeter will be unstable and fluctuate, but a phase or range can be established. When the ammeter reading exceeds this range, the tools can be checked to make certain they are not dulled.

Modified Surface Treatment for Magnesium

APPROPRIATE additions of sodium dichromate to selenious acid baths provide a surface treatment for magnesium that compares favorably with standard chromate and selenium coatings from the standpoints of both salt-spray resistance and effectiveness as a paint base, according to a report by L. Whitby in the March 1949 issue of Metallurgia (London).

The coating composition is primarily selenium, but chromium, probably as partially-soluble chromate, is also present and is thought to account for the improvement in coating properties. The experiments indicate that the selenious acid-dichromate treatment avoids the two main disadvantages of straight selenious acid treatments; these disadvantages being (1) appreciable surface attack reducing fatigue strength of the metal and (2) poor adherence of the selenium coatings on magnesium-manganese alloys to specifications comparable with Dowmetal M, very commonly used in this country.

The bath recommended is an aqueous solution of 7.5 pct sodium dichromate plus 3 pct selenium dioxide, used at its boiling point. A 5-min immersion is recommended for the alloy corresponding to Dowmetal M, followed by mechanical removal of the surface layer if the material is to be painted. The other alloy used in the experimental work is covered by the following broad specification, all percents being maximums: Al, 9 pct; Si, 0.4 pct; Mn, 1 pct; Cu, 0.3 pct; and Zn, 1.5 pct. With the composition expressed as maximum throughout, the specification presumably covers all the wrought aluminum alloys commonly used in this country. For such alloys, immersion time is 30 min.

Life of the solutions is said to be exceptionally long and, for the alloys tested, the coatings were odor-free. Little effect upon fatigue endurance limit was noted.

Processing Variables And Blast

New National Open Hearth Steel Committee chairman E. G. Hill, director of metallurgy and development, Wheeling Steel Corp., Wheeling, W. Va.

. . . E. G. Hill elected openhearth committee chairman; T. F. Plimpton to head blast furnace, coke oven and raw materials group . . . T. B. Winkler wins McKune Award . . . Annual dinner features address by Clarence Randall of Inland Steel.

SULFUR elimination, cold metal operations, refractories, and quality factors in steelmaking, and principles concerning agglomerating and ore blending, were among the subjects under discussion by the more than 1200 registrants present at the 32nd joint conference of the National Open Hearth Steel Committee and the Blast Furnace, Coke Oven and Raw Materials Committee, AIME, held in Chicago last week.

Highlight of the technical program of the openhearth group was the McKune award paper, entitled, "Liquid Iron and Steel Temperatures in Practice" delivered by T. B. Winkler, engineer, research department, Bethlehem Steel Co., Bethlehem, Pa. Honorable mentions were received by F. G. Jaicks, Inland Steel Corp., East Chicago, Ind., for his paper on "The Effect of High Coke Oven Gas Firing on Open Hearth Operation," and by R. R. Fayles, Lukens Steel Co., Coatesville, Pa., for a paper entitled "Scrap Charging Key to Increased Open Hearth Production."

Election of officers resulted in the following selections by the openhearth committee: Chairman—E. G. Hill, director of metallurgy and development, Wheeling Steel Corp., Wheeling, W. Va.; vice-chairman—H. M. Griffith, works manager, Steel Co. of Canada, Ltd., Hamilton, Ontario; secretary and treasurer—Ernest Kirkendall. C. R. Fondersmith, superintendent of steel production, Armco Steel Corp., Middletown, Ohio, chairman of the 32nd conference, was unable to attend, due to illness.

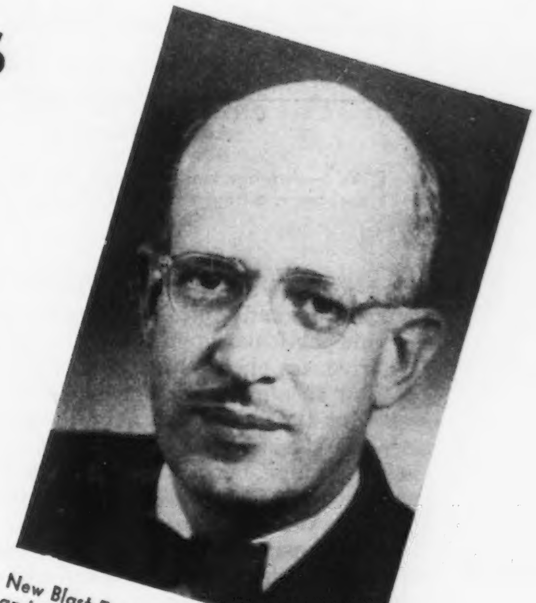
Officers elected by the blast furnace, coke oven and raw materials body were: T. F. Plimpton, superintendent, blast furnace department, Inland Steel Co., Indiana Harbor, Ind., chairman; R. W. Campbell, superintendent, coke department, Jones & Laughlin Steel Corp., Pittsburgh, vice-chairman; H. V. Lauer, field supervisor, raw materials, Carnegie-Illinois Steel Corp., Chicago, vice-chairman; and W. S. Unger, consulting engineer, Carnegie-Illinois Steel Corp., Pittsburgh, secretary. Outgoing chairman is T. L. Joseph, Professor of Metallurgy, University of Minnesota, Minneapolis.

The nontechnical phase of the meeting, namely the annual fellowship dinner, featured an address by Clarence B. Randall, assistant to the president, Inland Steel Co., Chicago.

Correlating data obtained from extensive use of platinum immersion thermocouples for routine metal temperature measurements, McKune award winner T. B. Winkler presented an interpretation of the influence of metal temperature during the various stages in steelmaking, in both basic electric and basic openhearth processes. A summary of the information obtained in the study is given in table I. From these average values, it is evident that about 300°F is lost in transporting the hot metal from the blast-furnace runner to the openhearth furnace when submarine transfer ladles are used. When open-top ladles are substituted for the submarine type, this temperature drop is increased by another 40°F.

An interesting comparison was given concerning the effect of fuel oil consumption on bath temperature change when using ore and when using oxygen in place of ore. For example, when

Studied by Openhearth Furnace Operators



New Blast Furnace, Coke Oven and Raw Materials Committee chairman T. F. Plimpton, superintendent, blast furnace department, Inland Steel Co., Indiana Harbor, Ind.

making 135-ton heats finishing under 0.10 pct C at bath temperatures up to 2900°F, a fuel input of 200 gal per hr caused a zero rate of temperature rise for normal ore heats, while for heats decarburized with oxygen the same amount of fuel produced a temperature rise of about 1.5°F per min.

A study of ladle temperatures revealed that on heats of fully aluminum-killed low carbon grades, there was virtually no loss in temperature from furnace to ladle: the heat liberated by the oxidation of the aluminum is apparently absorbed by the steel in the ladle. Measurements on various grades of killed steel showed that ladle aluminum additions of 3¼ lb per ton resulted in no temperature drop from furnace to ladle, while 2½ lb per ton caused a loss of 20°F and 1¼ lb per ton caused a loss of 40°F. These values are compared with a 70°F drop for rimmed steel having a very small ladle addition.

Loss in metal temperature in 60-ton acid openhearth ladles showed that immediately after the ladles were filled the rate of temperature drop was about 3.25°F per min, whereas at the end of 35 min the rate had decreased to 1°F per min. Ladle losses were also determined on fifteen 70-ton basic electric heats for a period of about 10 to 15 min after the end of tap; the rate of drop on these heats averaged about 3°F per min.

In his paper, "Effect of Nitrogen in Improving Physical Properties of Low Carbon Steel," S. C. Faddis, Assistant Metallurgist, Pittsburgh Works, Jones & Laughlin Steel Corp., pointed out that a degree of control has been given the steelmaker that will permit the metallurgist to make advantageous use of nitrogen in the development of certain desirable physical properties in important low carbon steel applications. Nitrogen content in hot metal from the blast furnace ranges from 0.002 to 0.005 pct; in scrap-hot metal openhearth steel, it ranges from 0.003 to 0.006 pct, while in bessemer practice the range is from 0.011 to 0.020, depending upon the nitrogen pick-up from the air blast at the end of the blow. The duplex process, a combination of the acid converter and basic openhearth methods, offers the best control possibilities.

Nitrogen is a hardening element and can be used in improving tensile strength, yield point, hardness, stiffness and resistance to fluting in hot and cold rolled strip metal products. As noted in fig 1, tensile strength is approximately 2000 psi higher for the 0.010 nitrogen heats than for the 0.004 nitrogen heats with the same carbon content. The gage range used for this example is 0.469 to 0.625 in.; however, the same difference is encountered for gage ranges of 0.313 to 0.438 in. and 0.188 to 0.281 in.

Probably the most desirable application of the higher nitrogen steel is cold reduced tinplate mainly for can body and end stock. In view of the greater sensitivity of these steels, considerably less cold working in the form of temper passing or skin rolling is necessary to obtain the desired hardness.

To show specifically the effect of relatively higher nitrogen in assisting in meeting higher hardness specifications, the frequency v. hardness curve, fig. 2, was presented. The application se-

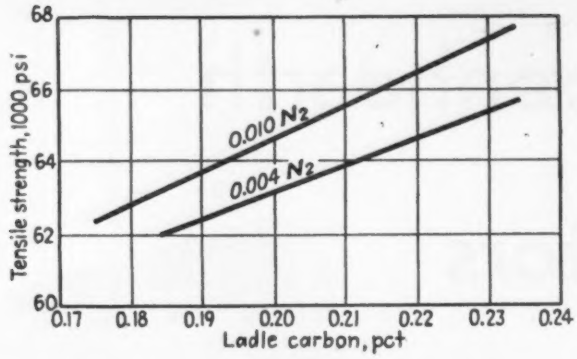


FIG. 1—Average tensile strength for various ladle carbons v. nitrogen contents of semikilled plate steels.

lected for this study was a material to be used for sanitary end stock T-4 temper specification. For this particular application, the consumer prefers hardness on the high side of the range, requesting an aim average of 62 R30T. It can be seen from the figure that, not only did the higher nitrogen steel do a better job of meeting the hardness range, but it was also more uniform and met the aim of 62 R30T more consistently than did the lower nitrogen steel.

Since experience indicates that the economically important factor of semifinished surface quality may be affected by deoxidation practice, an investigation was conducted concerned with practical production work devoted to improvement of surface quality on hot-topped coarse grained steels. A report of this study was presented by L. R. Silliman and H. J. Forsyth, Republic Steel Corp., in their paper, "Deoxidation v. Surface Quality." Coarse-grained steel C 1137 was chosen for the investigation and was poured in the 23x25-in. hot topped molds with the ingots rolled directly to 3 in. square billets. Billets were hand scarfed to remove all defects visible without pickling.

A study of the various steelmaking factors soon led to a closer inspection of blocking practice. Fig. 3 indicates the effects of 3 types of blocking practices on surface quality. It can be seen from the data, which involves 80 heats of the same specification rolled to the same size and hand scarfed without pickling, that scarfing manhours required per ton of billets were highest when the silicon pig block was used. The value decreased sharply when a change was made to silicomanganese, and dropped again when an absolutely tight block was employed. Reduction of seams accounted for most of this improvement.

Of further interest was the fact that heats requiring recarburization in the ladle showed an increase of surface defects. This became especially noticeable if more than 0.05 pct C was required in the ladle. The data contained in fig. 4 shows effects of ladle recarburization and blocking practice on scarfing manhours required per ton of billets. Based on results with heavy blocks and no recarburization required in the ladle, each increase of recarburization produced an increase in scarfing costs. Furthermore, this effect was most pronounced when the heavy tight block was not employed.

It was also found that by increasing aluminum additions to the ladle, if more than 0.05 pct recarburization was needed, resulting billet surface was considerably better than that obtained with no adjustment of deoxidation.

A. Maupin, Ceramic Engineer, Cleveland District, Republic Steel Corp., advised in his paper entitled, "Use of Sillimanite in a Hot Metal Mixer," that sillimanite is a high first cost refractory, being of the order of 6 times the cost of high heat firebrick. It has, however, more than paid for itself in the hot metal mixer through savings in materials and labor alone. The more important savings come from the longer performance of steady operation of the mixer.

Prior to 1945, a 1000-ton hot metal mixer was

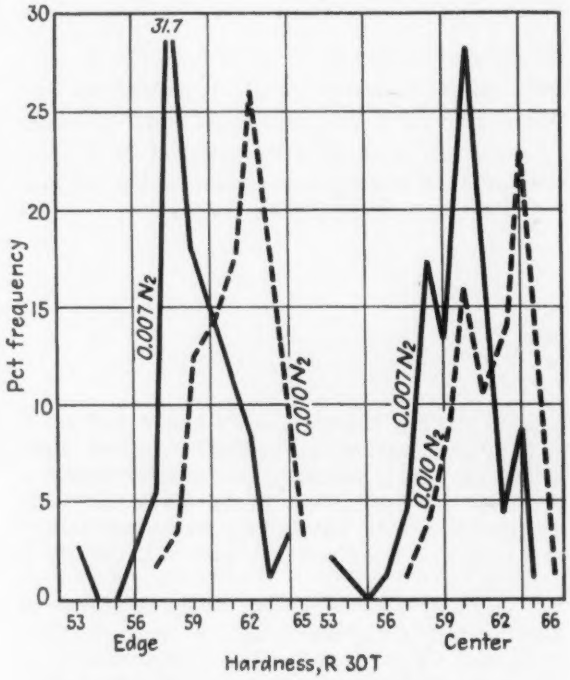


FIG. 2—Influence of nitrogen content on as-tempered hardness on edge and center of 0.0102 gage steel.

lined with high heat firebrick. The best campaign on this type of lining was 614,000 tons of hot metal. In July 1948, the mixer was shut down for repairs after handling 621,000 tons of metal. This represented a 49 pct increase in tonnage before repairs as compared with the previous campaign and was said to be the result of the use of larger sillimanite blocks in the jambs and a larger section of the jambs being built of sillimanite. During this shutdown, the jambs and walls of the pouring-out spout were replaced with new sillimanite brick. The mixer went back into service the same month and there were no further repairs until it came off for relining in February 1949. It had handled 1,183,000 tons of metal, which nearly doubles the record campaign on an all high heat firebrick lining. The masonry material and labor costs for the campaign were about 20 pct lower than the best campaign without sillimanite.

The all-basic openhearth furnace at South Works plant, Carnegie-Illinois Steel Corp., has, since June 1947, produced over 1350 heats. Dur-

ing this period, reported M. F. Yarotsky, superintendent of steel production, it operated under average shop conditions, the only exception being a firing rate of approximately 30 pct in excess of shop average and the use of oxygen and compressed air for flame enrichment.

During the early stages of experimentation the chief concern was the ability of basic construction under conditions of high furnace and flame temperatures. As more experience was gained, however, a study of the pattern of all-basic furnace characteristics made possible an evaluation of various operating factors such as: production, operating delays, fuel economy, metallurgical features of quality and overall economy.

With respect to overall economy of the product manufactured, experience to date has been of a negative nature. Cost of fuel and hot work repairs have more than offset the favorable effect of increased production on pertinent items of cost

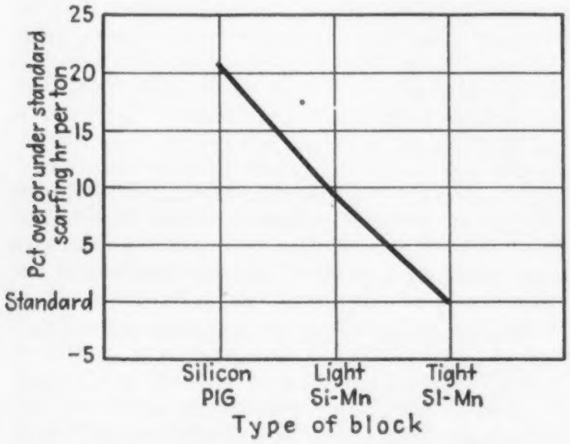


FIG. 3—Effect of blocking practice on scarfing requirements.

by approximately 2 pct of the total. Too little is known as yet regarding the mechanism of failure of basic brick in openhearth service. It is commonly held that failure occurs as a result of absorption of iron oxide, the formation of solid solutions with chrome constituents within the brick and the subsequent growth and bursting of the refractory. Laboratory studies indicate that brick destruction can be effected when iron oxide is absorbed into the brick and the brick is subjected to alternate cycles of heating to openhearth temperatures and cooling to 2200°F. Tests have shown that this effect becomes pronounced under an oxidizing atmosphere and may be minor or lacking under a reducing atmosphere. It is of interest to note that the chrome-magnesia brick showing the best service results to date exhibits the highest resistance to iron oxide bursting in the laboratory test.

Fuel economy presents a definite problem in the all-basic furnace. Fuel consumption for the overall period is almost 7 pct higher than the shop average, and while a certain portion of the differential may be accounted for by increased firing rates, the other contributing factor may be found in increased heat losses by radiation in basic brick as compared to silica brick. An experi-

TABLE I

Temperature Variation of Hot Metal

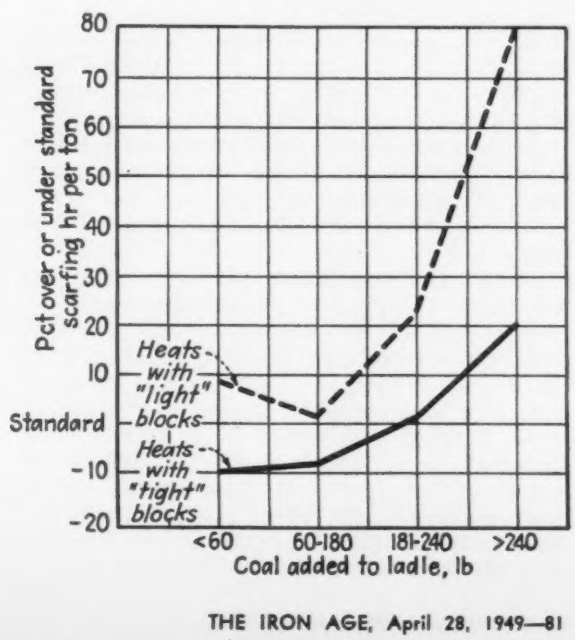
Maximum variation from cast to cast	2600° to 2765° F
Maximum variation within a cast	75° F
Drop from skimmer to full submarine transfer ladle	100° F
Drop in submarine ladle during approx. 1½ hr transfer from blast furnace to openhearth mixer	40° F
Drop in open-top transfer ladle during approx. 1½ hr transfer from blast furnace to openhearth mixer	80° F
Drop from submarine ladle, through mixer, to openhearth hot metal ladle	140° F
Maximum variation in openhearth hot metal ladles	2375° to 2425° F

ment showed that there was apparently no great difference in heat losses between the two types of roof for comparable roof thickness; however, since the basic roof thickness is less on the average throughout the campaign than a silica roof, the actual heat loss will be greater.

F. A. Colledge, Supt. of Masonry, Homestead District Works, Carnegie-Illinois Steel Corp. reported in his paper entitled, "Rammed Metal Mixer Lining," the use of plastic superduty fire clay ramming mix for patching small eroded sections in metal mixers. Based on satisfactory results obtained with a few such patches, a major repair job was performed on the 1000-ton mixer at Homestead employing rammed superduty plastic fire clay material over the eroded brick work.

The speaker advised that this particular job was a severe test and resulted in the opinion that the material may be suitable for small patches in small mixers, but the application should not exceed a thickness of 6 in.

FIG. 4—Effect of coal additions and blocking practice on scarfing requirements.



Nodular Graphite Irons . . .

Reports of nodular graphite irons highlight sessions at Western Metal Show . . . Attendance at exhibits totals 25,000.

o o o

FOR the second time since the end of World War II, metals men from the 11 western states gathered by the thousands to hear technical authorities from all parts of the country discuss new developments in their fields at the recent sixth Western Metal Exposition and Congress in Los Angeles.

The technical sessions involved some 76 papers, presented by the American Society of Metals, American Institute of Mining and Metallurgical Engineers, American Foundrymen's Society, American Welding Society, and the Society for Non-Destructive Testing.

While the agenda included almost every phase of metal production and working, particular interest was shown in nodular cast iron, in the new heat resisting alloys and in light metals.

Approximately 25,000 members of the metals trade visited the exhibits at the Shrine Auditorium where 211 manufacturers of machine tools, metal fabricators and producers and distributors displayed equipment.

There was a notable difference in the tone of exhibits and attitudes of attendants at this show and at that held in Oakland, Calif., in 1947—there was considerably more "sell" in evidence. The progress toward industrialization of the West is exemplified by the increase in the number of exhibitors at the recent show compared with the 79 firms which took space in the first event of this kind in the West held in 1929.

At least three new machine tools were shown for the first time by western manufacturers who are making a bid for national markets. About one-third of the exhibitors were western companies.

The high interest in nodular graphite cast iron was amply indicated by the attendance at a session on this subject sponsored by the American Foundrymen's Society. One paper, entitled "Variables in the Production of Nodular Graphite Cast Iron by Magnesium Treatment," presented by G. E. Holdeman and J. C. H. Stearns, Dow Chemical Co., Midland, Mich., reported on investigations conducted by Dow on the use of magnesium to obtain spheroidal graphite in cast iron, with particular emphasis on the variables encountered in this work.

As a generality, the authors stated, tensile strengths of 70,000 to 120,000 psi have been obtained in treated irons which normally run from 20,000 to 40,000 psi. By proper composition control, considerable elongation may be produced in the as-cast state. Simple heat treatment (such as 1 hr at 1650°F) has given elongations of 20 pct, while still retaining tensile strengths of 70,000 psi. Toughness is also materially increased. Cast iron properly treated with magnesium retains good foundry characteristics and good machinability. It is possible, however, to get a poor magnesium treatment as a result of the addition of too much or too little magnesium. Too much magnesium will produce an unduly hard iron while too little magnesium will not give completely nodular graphite in the iron. Thus far, indications are that the optimum range is approximately 0.03 to 0.1 pct Mg retained in the iron.

The treatment is not as simple as just adding magnesium to iron. Magnesium boils at 2007°F and is reactive at temperatures of liquid iron. Treatment with pure magnesium will be found to be quite spectacular due to the brilliant white light and white smoke produced by burning magnesium. Attempts to plunge this material into a ladle of cast iron or to pour cast iron on magnesium will undoubtedly result in blowing metal out of the ladle.

It has been found, however, that alloys of magnesium with other metals, particularly copper and nickel, may be used to reduce the reactivity. The 50-50 alloys of either copper or nickel are still quite spectacular when added to the surface of the cast iron, but a 20 pct Mg-80 pct Cu alloy is comparatively quiet and the 20 pct Mg-80 pct Ni alloy is only slightly more reactive. An alloy of 10 pct Mg-90 pct Cu burns with only a short flame on the surface of the iron while the 10 pct Mg-90 pct Cu also has a low rate of reactivity. Ordinarily a steel cover plate is used after the addition of 50-50 Cu-Mg or 50-50 Ni-Mg and any spattering and flash is much more confined.

A number of alloys have been investigated as possible means of introducing magnesium into cast iron. In both the magnesium-copper and magnesium-nickel alloys the alloying efficiency as regards magnesium *increases* as the percentage of magnesium in the alloy *decreases*. The *reactivity decreases* in a like manner with the *decrease* in the magnesium content. An alloy of 20 pct Mg-80 pct Sb was found to be very quiet when added to the surface of cast iron. In fact, immersion of this alloy was possible without noticeable reaction. Unfortunately the alloying

efficiency for magnesium was low and the graphite structure was of an unusually coarse type. Magnesium-aluminum alloys show some promise as a means of adding magnesium. A 90 pct Mg-10 pct Li, while moderately highly reactive, was considerably less so than commercial magnesium. Nodular graphite was successfully produced through additions of this material. Magnesium silicide is too reactive to be of much current interest. Magnesium-zinc alloys in either the 50-50 or 25-75 compositions did not, in preliminary tests, appear to be particularly suitable because of high reactivity and low magnesium retention. No nodular graphite was produced. The same was said of 50 pct Mg-35 pct Cu-15 pct Zn. Magnesium-bismuth alloys are also quite reactive and do not readily produce nodular iron. Although all alloy possibilities have not been exhausted by any means, indications so far definitely favor the copper or nickel-magnesium compositions in which magnesium is not more than 30 pct.

In addition to the effect of alloy composition on reactivity, several other points were brought out with respect to procedures for adding magnesium alloys to cast iron. In general, the alloys used for magnesium additions should be crushed before addition to the cast iron. This is particularly necessary in the case of the more reactive alloys. Particle sizes of 1/8 to 1/4 in. have been found to be reasonably satisfactory. No attempt should be made to immerse the alloys, except in the case of the 10 pct Mg-90 pct Cu and 10 pct Mg-90 pct Ni alloys.

The more reactive alloys may be placed in a light paper bag and dropped on the surface of the iron, or poured on the melt with a long handled scoop. The slag should be carefully removed from the surface of the iron before the magnesium addition is made, since a coating over the melt surface will prevent the alloying of the magnesium. A light gage steel cover placed over the ladle immediately after the magnesium addition will tend to confine the flash and probably improve the alloying efficiency in the case of the more reactive alloys. For dependable results a late silicon addition of about 0.4 pct Si should be made. This addition may be in the form of ferrosilicon, calcium-silicon or exothermic ferrosilicon ($FeSi + NaNO_3$).

The duration of the magnesium treatment effect is relatively short lived. With constant temperature holding of about 50 lb melts, it has been found that the effect largely disappears in about 10 min. There is a gradual deterioration of the nodulizing effect rather than a sharp line of demarcation between treated and untreated metal. It is possible that with larger ladles and dropping temperatures such as would be encountered in actual practice, the effect would persist for a longer time. In remelting, it will be found that the magnesium burns out, and there is no carryover of the nodulizing effect.

The amount of magnesium alloy which it is necessary to add will vary with the alloy used and the iron to be treated. The treatment is effective on either hypo or hypereutectic irons.

A typical general purpose iron having a base composition of 3.2 to 3.6 pct TC, 1.8 to 2.5 pct Si, 0.3 to 0.4 pct Mn, 0.05 pct P and 0.03 pct S, lends itself readily to the nodulizing treatment.

As Los Angeles Saw the Metal Show

"He dares you to show him some unbreakable metal!"

—Courtesy L.A. Evening Herald & Express

However, it does not always occur that such a composition is used and variations sometimes affect the magnesium treatment and its efficiency. If the sulfur content of the cast iron is not initially low, a portion of the magnesium will be used to reduce the sulfur to a low level, that is 0.03 to 0.04 pct. It has been found that if the sulfur content is initially high, a higher manganese content, such as 0.8 pct, will serve to reduce the necessary addition of magnesium.

If it is desired to produce an iron with an appreciable as-cast elongation, the manganese should be held to 0.3 to 0.4 pct and the phosphorus in the range of 0.05 pct. Nodular graphite can, however, be produced in alloys having manganese as high as 1.4 pct and phosphorus contents as high as 0.60 pct. Although manganese and phosphorus do not interfere with the producution of nodular graphite, they do affect elongation.

Some elements have been found to interfere with or poison the magnesium treatment. Titanium and zirconium, in mechanical mixtures with magnesium, have been found to prevent the nodulizing effect. Calcium-silicon, added before the magnesium, completely prevented the formation of spherulitic graphite. The use of carbon as a late inoculant after the magnesium, in place of silicon, has been found to be unsatisfactory. The simultaneous addition of ferrosilicon and the magnesium alloy is not recommended for best results. Also, the addition of exothermic ferrosilicon simultaneously with magnesium is not to be recommended. However, the late silicon addition may be in the form of exothermic ferrosilicon. If one so desires, ferrosilicon may be added before the magnesium alloy so long as a late addition is also made.

The use of flux mixtures with the magnesium

alloys has been briefly investigated and has interesting possibilities.

The addition of exothermic carbon to the cast iron before the magnesium addition does not appear to be detrimental. However, carbon additions after the magnesium additions are not recommended.

The production of nodular graphite can be achieved in all common cast iron compositions. With a proper magnesium treatment, machinability of nodular cast iron is good. Excess magnesium will give increased hardness with, of course, increased machining difficulty. Cut surfaces tend to be smoother with less tearing than gray iron develops.

Usual arcwelding techniques developed for cast iron are applicable to the nodular cast irons. In welding with a nickel rod there appears to be a narrow zone of increased hardness along the edge of the weld zone, but there is no reversion to flake graphite. Spheroidal graphite has even been noted floating in the zone of fusion.

The casting qualities of nodular cast irons appear to be good. There appears to be no decrease in fluidity but shrinkage of the treated iron is somewhat greater than in gray iron; therefore, heavier risers may be required.

Nodular Iron Made Under Ordinary Conditions

A report of experiments to produce nodular cast iron under ordinary foundry conditions was given in a paper presented by E. K. Smith, consulting metallurgist, Los Angeles, entitled "Nodular Graphite in Cast Iron." The first experiments, Smith said, were made with cerium treatment of cupola iron, but as expected, there was no effect on strength or carbon form due to the high sulfur, high phosphorus hypoeutectic iron used.

The base metal was a good grade of unalloyed iron, about 42,000 psi strength, with 3 pct C, 0.28 pct P, and 0.14 pct S.

Magnesium, as 50-50 Mg-Cu alloy, and also stick magnesium was used in amounts up to 1½ pct Mg, the only result being a drastic reduction in chill (An increase in chill had been expected, due to carbide forming properties of magnesium.). On obtaining analyses it was found that the magnesium had acted purely as a desulfurizer, the much lower sulfur accounting for the lower chill. No magnesium remained in the iron to affect either strength or graphite form.

Based on published information, it was thought that the high phosphorus (0.28 pct) might be inhibiting the magnesium effect, and a cupola melt was made, using all steel, with ladle inoculation. Phosphorus in this very strong iron was only 0.035 pct, but additions of magnesium still produced no effect on strength or graphite form, indicating that the amount of phosphorus present had no effect on formation of nodules. This left only sulfur as a possible inhibitor, and experiments were switched to low sulfur iron.

Next experiments involved magnesium additions to commercial cast iron melted in an arc furnace. This iron ran 3.00 pct C, 0.75 pct Mn, 0.035 pct S, 0.04 pct P, 2.20 pct Si, 0.26 pct Cr and 0.68 pct Mo. This composition was almost the same as the cupola metal, except that the electric furnace iron had 0.035 pct S, as compared with 0.140 pct in the cupola iron. (Other experiments had shown that the alloys present would have no detrimental effect.)

Ladle additions of magnesium to this iron immediately resulted in a substantial increase in strength, and nodular graphite form. Additions of magnesium-copper were made to ladles almost covered with steel plates, just enough opening remaining to admit the magnesium. After the last lump of alloy had been added, the iron was stirred and, while stirring, 0.40 pct Si was added as 85 pct ferrosilicon.

Best results were obtained by addition of 1 pct Mg. Magnesium in iron, as shown by spectroscopic analysis, ranged from 0.035 to 0.12 pct, the latter with a larger addition.

Comparative Tool Steel Brands

THE second, revised edition of THE IRON AGE compilation of comparable tool steel trade names is presented on the facing insert. This tabulation does not cover every grade in the ASM classification, but in the interest of space considerations embraces the most active grades.

There was no difficulty in repeating results. Typical data on as cast bars made from keel blocks were: Tensile strength 99,500 psi; elongation 6.5 pct; reduction in area 4.5 pct, and Brinell hardness 248.

The nodular iron machined readily forming long curls. About 341 Brinell was the limit of machinability.

Shrinkage was increased with increasing magnesium, as evidenced by progressively deeper cupping of keel blocks. Arbitration bars contained a central shrinkage spot.

In order to check these results on cupola metal, the iron was desulfurized in the ladle, and 1 pct Mg added. In this case the chill was greatly increased, and nodular structure was found in the chill test.

It is believed that either cerium or magnesium processes (and probably other processes) can be readily used by any foundry with good metallurgical control—whether gray iron shop with cupola metal (possibly with basic lining), malleable foundry with air furnace metal, or steel plant with electric furnace.

Comparative Tool Steel Brands

CARBON TOOL STEELS

Type	Best Grade Special	Extra	Regular	Carbon TS Not Subject to Tests	First Qualit[y] C Drill Ro[d]
Allegheny-Ludlum	Pompton Special	Pompton Extra	Pompton	Corinth	Pompton D. R.
Bethlehem	XXX	XX	XCL	X	...
Braeburn	Special	Extra	Standard	...	...
Carpenter	Special	Extra	Comet	...	Green Label Drill
Columbia	Special	Extra	Standard	Electrex	...
Crucible	Sanderson or Crescent Special	Sanderson Extra	Black Diamond	...	Sanderson Spec. D
Disston	Best	Extra	Standard	...	...
Firth-Sterling	Special Special ASV	Extra	Sterling	Silver Star	Globe
Jessop	Washington	Lion Extra	Chippaway Lion	Dacar	Ranger D. R.
Latrobe	Special Carbon	Extra Carbon	Standard Carbon	...	Quality Carbon Drill Rod
Simonds	Red Label	Blue Label	Diamond S	...	...
Universal-Cyclops	Special	Extra	Standard	...	Carbon Drill Rod
Vanadium-Alloys	Colonial No. 14	Extra L	Red Star Tool	...	Blue Anchor
Vulcan	Vulcan Sp.	Extra	Fort Pitt	...	

NONDEFORMING DIE STEELS
ASM Class II

ASM Class	II A-1	II A-2	II A-3	II B-1	II B-2	II C	
Alloy Class	Low Mn, Cr-W Oil Hardening	High Mn Oil Hardening	Low W Oil Hardening	Mn Air Hardening	5% Cr Air Hardening	High C—High Cr Oil Hardening	Hi
Allegheny-Ludlum	Saratoga	Deward	Utica	Airloy	Sagamore	Huron	Ontari
Bethlehem	BTR	...	67 Tap	BA-H	A-HS	Lehigh S	Lehigh
Braeburn	Kiski	S.O.D.	Keystone	...	Airque	Superior 1	Superi
Carpenter	...	Stentor	...	Vega	No. 484	Hampden	No. 61
Columbia	Exl-Die	...	...	...	...	Superdie	Atmod
Crucible	Ketos	Paragon	Champion Extra	...	Airkool	HYCC	Airdi 1
Disston	Mansil	...	Semi High Speed	...	...	812 Die Steel	Croloy
Firth-Sterling	Invaro	...	Meteor	...	Airvan	Triple Die	Chrom
Jessop	Truform	Special Oil Hardening	...	...	Windsor	3C	CNS
Latrobe	Badger	Mangano	W Tap	...	Select B	GSN	Olymp
Simonds	Simonds	Teenax-46	Simonds O.H.D.	...	...	...	Simon
Universal-Cyclops	Wando	...	Para	...	Sparta	Ultradie No. 1	Ultrad
Vanadium-Alloys	Non-Shrinkable Colonial No. 6	...	Red Star Tungsten	...	Air Hard	Crocar	Ohio D
Vulcan	Vulcan Oil Hardening	Non-Shrinkable	Hardrite	Vairloy	Vuldie	Hi-Pro	Alidie

SHOCK RESISTING STEELS
ASM Class III

ASM Class	III-A	III-B	III-C	III-D	III-E
Alloy Class	Cr-V	Low Si-Mn	High Si-Mn	W	W-Si
Allegheny-Ludlum	Caroga	...	602, 609	Seminole Medium	Seminole Hard
Bethlehem	Tough M	...	Omega	67 Chisel	...
Braeburn	Chrome Vanadium	Triton R. B. Chisel	...	Vibro	...
Carpenter	...	Solar	S-M	Excello	...
Columbia	...	...	...	Buster	...
Crucible	Halvan	SMC 155	LaBelle 2-70	Antha Pneu	...
Disston	...	...	D-29	Keystone Alloy Chisel	...
Firth-Sterling	Demmler D	...	Chimo	J-S	...
Jessop	89 MC	Catawba	Magic	Top Notch	...
Latrobe	Crown	Trident	Lanark	XL Chisel	...
Simonds	...	...	Havoc	Commando 47	...
Universal-Cyclops	Orion	Venango	No. 67	Alco	Alco "S"
Vanadium-Alloys	Vanadium Type	...	Silman Mosil	Par Exc.	
Vulcan	Hecla	...	4870	Vulcan Q. A.	

Brands

Regular	Carbon TS Not Subject to Tests	First Quality C Drill Rod	Commercial Drill Rod
	Corinth X	Pompton D. R.	Commercial Drill Rod
	....	....	....
	....	Green Label Drill Rod	....
iamond	Electrex	Sanderson Spec. D. R.	Victor
	....	....	....
	Silver Star	Globe	Comm. D. R.
ay Lion l Carbon	Dacar	Ranger D. R. Quality Carbon Drill Rod	Commercial Drill Rod Commercial Carbon Drill Rod
d S	....	....	....
r Tool	....	Carbon Drill Rod Blue Anchor	Red Anchor
	....	....	....

I B-1	II B-2	II C	II D-2	II D-3
Mn Hardening	5% Cr Air Hardening	High C—High Cr Oil Hardening	1.50 C, Hi C-Hi Cr	2.15 C, Hi C-Hi Cr, Air H
.....	Sagamore A-HS Airque No. 484	Huron Lehigh S Superior 1 Hampden Superdie	Ontario Lehigh H Superior 3 No. 610 Atmodie	....
.....	Airkool	HYCC 812 Die Steel	Airdi 150 Croloy	....
.....	Airvan Windsor	Triple Die 3C	Chromovan CNS	....
.....	Select B	GSN	Olympic Simonds C.C.M.	....
.....	Sparta Air Hard	Ultradie No. 1 Crocar	Ultradie No. 2 Ohio Die	....
	Vuldie	Hi-Pro	Alldie	....

III-C	III-D	III-E	
High Si-Mn	W	W-Si	C-V
....	Seminole Medium 67 Chisel Vibro Excello Buster	Seminole Hard	Python Best or Superior Special No. 11 V Vanadium Extra
2-70	Antha Pneu Keystone Alloy Chisel J-S Top Notch XL Chisel Commando 47	....	Alva Extra Ster V Washington Vanadium Renown
Mosil	Alco Par Exc. Vulcan Q. A.	Alco "S"	Draco Colonial No. 7 Colhed Vulcan Spec. Van.

HOT WORK STEELS

HIGH SPEED STEELS

HIGH SPEED STEELS

The second, revised edition of The Iron Age Tabulation of comparable tool steel trade names is presented herewith. This tabulation, compiled with the co-operation of 14 tool steel producers, is based on the new ASM classification, with the exception of the carbon tool steel grade.

HOT WORK STEELS
ASM Class IV

ASM Class	IV A-1	IV A-2	IV-B	IV-B-2	IV F-1	IV F-2	IV F-3	IV F-4
Alloy Class	0.65 C, 4% Cr	0.90 C, 4% Cr	5% Cr, No W	5% Cr, 1% W	9% W	12% W	15% W	18% W
Allegheny-Ludlum	EB Alloy		Potomac M	Potomac	Atlas A	Atlas B	Mohawk	LXX-5T
Bethlehem			Cr-Mo-V	Cr-Mo-W	57 Hot Work		57 Special Hot Work	
Braeburn			Pressurdie No. 3	Pressurdie No. 2	T-Alloy A	T-Alloy	T-Alloy B	Vinco Hot Work
Carpenter			No. 883		TK		DYO	
Columbia			Firedie		Formite No. 2	Formite		
Crucible	LaBelle 89	Crescent Hot Work 2	Halcomb 218	Chro-Mow	Peerless A	Peerless LCT No. 2	Peerless LCT	Rex A Rex AA low C
Disston		HRW						
Firth-Sterling		CYW	HWD-2	HWD-1	LT LTL		XDL	XDH (C.55) XDM (C.45)
Jessop	J Hot Work Die	JJ Hot Work Die	Dica AA	Dica B	2B (LC)	2B (HC)	2B (MC)	
Latrobe		Select M	Dycast No. 1 V. D. C.	LPD M. G. R.	CLW		EHW No. 1 CHW	Low Carbon Electrite No. 1
Simonds					D. N. V.			
Universal-Cyclops		Ajax	Thermold A	Thermold B	B-44-J	B-44	B-4	B6X
Vanadium-Alloys		Choice No. 1	Hotform No. 2	Hotform No. 1	Marvel		Forge-Die	Red Cut Superior J. Temper
Vulcan	Vulcan No. 6 HW	Vulcan No. 4 HW		TCM	Calo-Ferro 30	Calo-Ferro 45		Wolfram Low Carbon

HIGH SPEED STEELS
ASM Class V
Mo Type

ASM Class	V A-3	V A-1	V A-2	V B-1	V B-2	V B-3	V B-4	V B-5
Alloy Class	M-2 W-Mo	0-8 Mo-V	2-8 Momax	Momax 5% Co	2-8 -8 Momax	W-Mo 5% Co	W-Mo 8% Co	W-Mo over 8% Co
Allegheny-Ludlum	DBL-2	VLM	LMW		Super LMW		Super DBL	
Bethlehem	66 H. S.		Bethlehem HM					
Braeburn	Braemow M-2		Mo-Cut	Como				Congo
Carpenter	Speed Star		Star Max					
Columbia	Molite							
Crucible	Rex M-2	Rex VM	Rex TMO	Rex TMO-5		Rex M2-5		
Disston	6 N 6 M-2		Di-Mol					
Firth-Sterling	Star Mo M-2	Hi-Mo V	Hi-Mo	Super Hi-Mo	Super Mo-Chip			Super Star-Mo
Jessop	Mustang		Mogul			Mustang Special		
Latrobe	Electrite Double Six	Electrite TNW	Electrite Tatmo	Electrite Lacomo			Electrite Co-6	
Simonds	Molva T	Molva	STM					
Universal-Cyclops	Motung 652	Movan	Motung	Super Motung	Super Motung Special			
Vanadium-Alloys	Vasco M-2	Van-Lom	8 N-2					
Vulcan	TM-6		Vul-Mo					

HIGH SPEED STEELS
ASM Class V
Tungsten Type

ASM Class	V C-1	V C-2	V C-3		V D-1	V D-2	V D-3	V D-4
Alloy Class	18-4-1	18-4-2	18-4-3	14-4-2	14-4-2-5	18-4-1-5	18-4-2-8	20-4-2-12
Allegheny-Ludlum	LXX	ML				Panther Special	Super Panther	
Bethlehem	Bethlehem Special HS		Red Tiger	Extra Special		Comokut		
Braeburn	Vinco	Twinvan		Gyro		Braeburn Cobalt	Bonded Carbide Jr.	Bonded Carbide
Carpenter	Star Zenith	Super Star Zenith			Gold Star			
Columbia	Clarite	Vanite			Maxite			
Crucible	Rex AA	Rex Supervan		Rex Champion	Rex 95	Rex AAA	Rex Super Cut	Rex 440
Disston	Kutkwik						D-6-Co	
Firth-Sterling	Blue Chip	Blue Chip HV		Star Blue Chip			Circle C	
Jessop	Supremus	Supremus Extra		Jessco	Jessco B	Purple Label	Purple Label Extra	King Cobalt
Latrobe	Electrite No. 1	Electrite No. 19	Electrite Vanadium	Electrite U	Electrite U. B.	Electrite Cobalt	Electrite Super Cobalt	Electrite Ultra Cobalt
Simonds	Red Streak	Lockport Special		Niagara		Tunco	Super Cobalt	
Universal-Cyclops	B-6	B-9		B-42	B-8	B-7	B-10	
Vanadium-Alloys	Red Cut Superior	EVM				Red Cut Cobalt	Red Cut Cobalt 8	Gray Cut Cobalt
Vulcan	Wolfram	Vulcan Super				Wolfram Cobalt		

Compiled by The Iron Age

Br

Iron Age Tabulation of comparable herewith. This tabulation, compiled producers, is based on the new ASM of the carbon tool steel grade.

Regular
iamond
ay Lion
l Carbon
d S
Tool

3-2	IV F-1	IV F-2	IV F-3	IV F-4
1% W	9% W	12% W	15% W	18% W
	Atlas A	Atlas B	Mohawk	LXX-5T
	57 Hot Work	....	57 Special Hot Work	....
No. 2	T-Alloy A	T-Alloy	T-Alloy B	Vinco Hot Work
....	TK	....	DYO	....
....	Formite No. 2	Formite	....	....
/	Peerless A	Peerless LCT No. 2	Peerless LCT	Rex A Rex AA low C
....	....	....	....	
	LT LTL	....	XDL	XDH (C.55) XDM (C.45)
	2B (LC)	2B (HC)	2B (MC)	....
. R.	CLW	....	EHW No. 1 CHW	Low Carbon Electrite No. 1
....	D. N. V.	....	....	....
B	B-44-J	B-44	B-4	B6X
o. 1	Marvel	....	Forge-Die	Red Cut Superior J. Temper
	Calo-Ferro 30	Calo-Ferro 45	....	Wolfram Low Carbon

B-1
Mn
Hardening

-1	V B-2	V B-3	V B-4	V B-5
5% Co	2-8 -8 Momax	W-Mo 5% Co	W-Mo 8% Co	W-Mo over 8% Co
....	Super LMW	....	Super DBL	....
....	....	....	....	
	....	....	....	Congo
....	....	....	....	....
	....	....	....	....
-5	....	Rex M2-5	....	....
Mo	Super Mo-Chip	....	....	Super Star-Mo
	....	Mustang Special	....	....
acomo	....	....	Electrite Co-6	....
	....	....	....	....
tung	Super Motung Special			
....	....	....	....	....
	....	....	....	....

III-C
High Si-Mn
2-70
Mosil

4-2	V D-1	V D-2	V D-3	V D-4
	14-4-2-5	18-4-1-5	18-4-2-8	20-4-2-12
....	....	Panther Special Comokut	Super Panther	....
cial	....			....
	....	Braeburn Cobalt	Bonded Carbide Jr.	Bonded Carbide
....	Gold Star Maxite	....	....	....
pion	Rex 95	Rex AAA	Rex Super Cut D-6-Co Circle C	Rex 440
	....	....		....
Chip	....			....
	Jessco B	Purple Label	Purple Label Extra	King Cobalt
J	Electrite U. B.	Electrite Cobalt	Electrite Super Cobalt	Electrite Ultra Cobalt
	....	Tunco	Super Cobalt	....
	B-8	B-7	B-10	....
....		Red Cut Cobalt	Red Cut Cobalt 8	Gray Cut Cobalt
....		Wolfram Cobalt	....	....

Compiled by The Iron Age

Typewriter Parts Fixtured for Induction Brazing

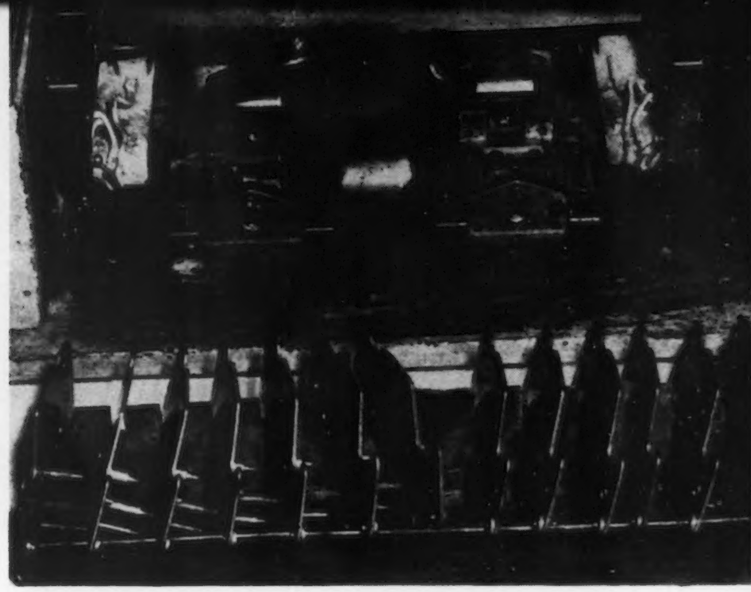


FIG. 1—This fixture is employed for brazing end plates, sets of which are shown in the foreground, to the channel portion of a typewriter carriage. Induction heating coils are located at right and left below the air operated clamping heads.

CARRIAGES for the new electric typewriter, manufactured in the Poughkeepsie plant of International Business Machines Corp., are fabricated from three steel stampings. The trough-like central stamping has a plate fastened to each end by silver brazing in an air operated fixture, air plungers holding the two plates against the squared ends of the central stamping while brazing is done.

Before loading into the fixture, the areas of each stamping that are to be brazed are coated with Handy flux applied by dipping and brushing. End plates are set in a rack for the flux to dry, as this helps to keep excess flux away from the heating coils, one of which is at each end of the fixture, fig. 1.

End plates are loaded into the fixture first, being located on pins that fit holes in these stampings. Then the central stamping is put into position so that its ends are close to the plates and each end is above a part of one heating coil that extends also around the plate area to be heated, as shown in fig. 2. When this has been done, a spreader bar is placed between the end stampings, to help keep end plates square and to prevent the pressure applied from each end from closing too tightly the joints to be brazed. The bar also helps to insure correct overall length of the assembly.

FIG. 2—After parts to be brazed are in place, a spacer bar is applied and the fixture locked. A strip of silver alloy wire is placed at each joint and the heating cycle is started.

When the parts are in place, the operator presses a button to start the brazing cycle. This causes the clamping rams to advance and the induction coils to energize from the 15-kva Lepel machine. As the joints are heating, the operator uses tweezers to place a short length of Easyflow silver solder wire adjacent to each joint. The lengths of solder rest transversely, one at each end of the trough and parallel to the planes of the joints.

When the solder melts, it flows into the joints, some flowing upward about $\frac{3}{4}$ in. along the ends of the upturned parts of the trough. At the instant that this occurs, current is shut off automatically, the solder freezes, the fixture unclamps and the completed assembly is lifted out. While heating takes place, the operator puts flux on new parts.

The brazed joints are strong and secure and production is at the rate of about 300 in 8 hr with a single operator. This is more than three times the rate formerly attained with flame heating. A still faster rate can be attained if a helper applies flux, leaving the operator free to load, unload and operate the machine. The unit has an exhaust vent to draw off flux fumes.

Two air clamping cylinders at the rear of the fixture operate slides that lock the channel stamping in place. End stampings are clamped by air plungers at each end of the fixture. The whole right end of the fixture, including two clamping cylinders and the parts they operate, is made adjustable along the supporting tubes by a hand wheel operating a screw. This permits brazing carriages of different lengths.

A Guide to Colorimetric Methods of Analysis

A comprehensive review of the colorimetric methods practical in the metallurgical analytical laboratory is given by the author. The data sheet accompanying the text tabulates the elements in the various ferrous and nonferrous alloys which can be determined colorimetrically. Those elements which are best determined colorimetrically, taking into consideration the time involved and other factors, are indicated, and outlines of procedures for the elements are given along with supporting references.

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OVER the past decade speed and precision in the analytical laboratory have been materially aided by the development and refinement of colorimetric instruments and techniques.

Modern photoelectric colorimeters using light filters have ended the era of single color analyses, have eliminated the margin of error introduced by visual comparisons and have stimulated the reinvestigation and rewriting of many analytical procedures. Green colors, for instance, can now be filtered out so that there is no interference with reds. Such progress in cutting back the number of interfering elements and making the removal of such ions no longer necessary has substantially reduced analytical work time and is encouraging the increased use of colorimetric techniques.

The purpose of this review is to indicate the elements in the various alloys, both ferrous and nonferrous, which can be determined colorimetrically and to provide brief outlines of the procedures involved in order that consideration of the techniques with reference to the needs and facilities at any particular laboratory will be possible. Literature references giving further details of the various procedures, and in many cases information on the results obtained or obtainable, have been included.

Precision of the methods will vary with the element being determined and the other ions present in the particular analysis, for lowered limits of sensitivity will often be induced by the coloring power of these other ions. The general precision of the modern photoelectric colorimeter, however, on the use of which the following tabulation and procedures are based, is 2 pct. Thus, tungsten in Stellites will list at 6.0 ± 0.12 pct, while lead in pure copper may be 0.004 ± 0.002 pct.

Applicability of the instrument depends on

Applicability of Colorimetric Analysis

ALLOY	ELEMENTS PRESENT	ELEMENTS DETERMINABLE COLORIMETRICALLY Those in boldface type are easily determined colorimetrically. Those in *italics* are best determined by other means. Numbers in parenthesis refer to procedure resumes which follow.*	COMMENTS
Section I. Irons and Steels			
LOW ALLOY IRONS AND STEELS, including SAE 10xx, 11xx, 13xx, 23xx, 33xx, 43xx, 51xx and 61xx; residuals, bessemer, open-hearth and certain NE steels; armor plate; gray, malleable and cast irons; Nitralloy; and iron ores soluble in HCl.	Al, Sb, As, Be, Bi, B, Cd, Ca, C, Ce, Cr, Co, Cb, Cu, Fe, Pb, Mq, Mn, Mo, Ni, N, O, P, Pt, Se, Si, Ag, S, Ta, Te, Tl, Th, Sn, Ti, W, V, Zn, Zr.	Al(1), Sb(2), As(3), Be(4), *Bi*(5), B(6), *Cd*(7), *Ca*(8), *C*(9), Cr(10), Co(11), Cu(12), Pb(13), *Mg*(14), *Mn*(15), Mo(16), *Ni*(17), *N*(18), P(19), *Se*(20), Si(21), *Te*(31), *Sn*(22), Ti(23), *W*(24), V(25), *Zn*(26), Zr(27).	Elements (except Fe) range from 0 to 1.0 pct. with some higher. As, for examole, SAE 2345 and 6150, containing 3.5 pct Ni and 1.1 pct Cr.
ALLOY STEELS, including corrosion resisting, high speed, chrome-nickel stainless steels; and heat resistant cast irons.	Same as for Low Alloy Irons and Steels.	Al(1), As(3), Be(4), *Bi*(5), B(6a), *Ca*(8), Co(11), Cu(12), Pb(13), *Mn*(15), Mo(16), Ni(17a), *N*(18), P(19), *Se*(20), Si(21), *Sn*(22), Ti(23a), *W*(24), V(25a), *Zn*(26), Zr(27).	For rapid heat checks, the alloying elements are best run colorimetrically. Such methods are not restricted to trace tests. Co to 2 pct, Cu to 6 pct, Mo to 12 pct, Ni to 12 pct, Ti to 3 pct, W to 12 pct and V to 2 pct can be determined.
Section II. Heat Resisting Alloys			
NICKEL BASE ALLOYS HIGH IN CHROMIUM, including high temperature alloys; Nichrome; Monel; Inconel; Illium; and Hastelloy.	Al, C, Cr, Co, Cu, Fe, Mn, Mo, Ni, P, Si, S, Ti, Zr.	Al(1), Co(11), Cu(12c), Fe(28), *Mn*(15), Mo(16), P(19), Si(21), Ti(23a), *W*(24), Zr(27).	For corrosion resisting steels, see Section I, second grouping.
COBALT BASE ALLOYS, including high temperature alloys.	Same as for Nickel Base Alloys.	Omit Co. *Fe*(28b), Ni(17b), P(19), Si(21), Ti(23a), *W* (24), Zr(27).	
Section III. Nonferrous Alloys			
ALUMINUM BASE ALLOYS, including SAE 30-3, 320; 2S; 3S; Magnalium; wrought and sand cast.	Al, Be, Bi, Cd, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, Si, Sn, Ti, Zn, Zr.	Bi(5), *Cd*(7), Cr(10d), Co(11), Cu(12c), Fe(28c), Pb(13), Mg(14a, b), *Mn*(15), Mo(16), Ni(17a), Si(21b), Sn(22), Ti(23), Zn(26), Zr(27a).	As with iron alloys, groups of 3 elements may be determined from one sample weighing.
CADMIUM ALLOYS, including SAE 18, 180.	Al, Bi, Cd, Cu, Fe, Pb, Mn, Ni, Si, Ag, Sn, Zn.	Al(1a), Bi(5a), Cu(12), Fe(28c), Pb(13a), *Mn*(15), Ni(17a), *Si*(21), Ag(29), Sn(22), *Zn*(26a).	
COPPER AND COPPER ALLOYS, including SAE 480-3; Monel; Cupaloy; Navy G, H, M; gun metal; bearing bronzes; red brass, 85-5-5-5; manganese bronze; aluminum bronze; nickel silver; Ampco metal; and white metal.	Al, Sb, As, Be, Bi, Cd, Cr, Co, Cu, Fe, Pb, Mn, Ni, P, Se, Si, Ag, Te, S, Sn, V, Zn.	Al(30), Sb(2a), As(3b), Be(4), Bi(5c), Cd(7a), *Cr*(10e), Co(11), Fe(30), Pb(13b), *Mn*(15), Ni(30), P(19b), *Se*(20), Si(21), Ag(29), *Te*(31), *Sn*(22), V(25c), *Zn*(26b).	Applicable to rapid furnace heat checks for Cu and Ni (precision 1 pct).
LEAD AND LEAD BASE ALLOYS, including Satco metal; type metal and white metal.	Al, Sb, As, Bi, Cd, Cu, Fe, Pb, Mn, Ni, Si, Ag, Te, Sn, Zn.	Al(1d), Sb(2a), As(3b), Bi(5b), *Cd*(7b), Cu(12d), Fe(28e) *Mn*(15b), Ni(17c), *Si*(21c), Ag(29a), *Te*(31a), Sn(22a), Zn(26c).	Impurities in 99.97 pct lead determined colorimetrically.
MAGNESIUM ALLOYS, including SAE 50; Dowmetal; wrought and casting.	Al, Bi, Cd, Cu, Fe, Pb, Mg, Mn, Ni, Si, Sn, Zn.	Al(1e), Bi(5a), *Cd*(7), Cu(12), Fe(28c), Pb(13b), *Mn*(15), Ni(17), Si(21d), Sn(22b), *Zn*(26d).	Colorimetric procedures are prep ferred for these alloys and grou-methods can be used.
SILVER ALLOYS, including solders	Al, Bi, Cd, Cu, Fe, Pb, Mn, Ni, P, Si, Ag, Sn, Zn.	Al(1a), Bi(5d), Cd(7c), Cu(12), Pb(13a), *Mn*(15), Ni(17d), Sn(22a), *Zn*(26e).	
TIN AND HIGH TIN BASE ALLOYS, including SAE 10, 110; tin base babbitts; tin foil; Brittania; and pewter.	Al, Sb, As, Bi, Cd, Cu, Fe, Pb, Mn, Ni, Si, Ag, Sn, Zn.	Al(1f), Sb(2b), As(3), Bi(5e), *Cd*(7d), Cu(12), Fe(28f), Pb(13c), *Mn*(15), Ni(17), *Si*(21), Ag(29b), *Te*(31a), Zn(26f).	
ZINC ALLOYS, including SAE 903, 921, 925; Zamak; and aluminum solder.	Al, As, Bi, Cd, Cu, Fe, Pb, Mn, Ni, Si, Sn Zn.	Al(1e), As(3b), Bi(5a), Cd(7e), Cu(12), Fe(28f) Pb(13a), *Mn*(15), Ni(17), Si (21), Sn(22b)	Impurities in high grade zincs determined colorimetrically.
Section IV. Ferroalloys			
FERROALUMINUM.	Al, C, Cu, Cr, Fe, Mn, P, Si, S, Ti.	*Cr*(10), Cu(12), *Mn*(15), P(19), *Si*(21), Ti(23).	
FERROCHROMIUM.	Al, C, Cu, Cr, Fe, Mn, Mo, Ni, P, Si, S, Ti, V.	Al(1), Cu(12), Mo(16), Ni(17a), *P*(19), Ti(23a), V(25a).	
FERROMANGANESE.	Al, As, C, Cr, Co, Cu, Fe, Mg, Mn, Mo, Ni, P, Si, S, Ti, V, Zr.	Al(1), As(3), *Cr*(10a), Co(11), Cu(12), Mo(16), Ni(17a), *P*(19), *Si*(21), Ti(23a), V(25), Zr(27).	
FERROMOLYBDENUM.	Al, As, C, Cr, Cu, Fe, Mn, Mo, Ni, P, Si, S, Sn, Ti, W, V.	Al(1a), As(3), *Cr*(10b), Cu(12), *Mn*(15), Ni(17a), P(19), Si(21), Sn(22), Ti(23b), V(25a).	
FERROSILICON.	Al, Ca, Cr, Cu, Fe, Mn, Mo, Ni, P, Si, S, Ti, V.	Al(1), *Ca*(8), *Cr*(10), Cu(12), *Mn*(15a), Mo(16), Ni(17), *P*(19), Ti(23), V(25a).	
FERROTITANIUM.	Al, C, Cr, Cu, Fe, Mn, Ni, P, Si, Ti, V, Zr.	Al(1b), *Cr*(10c), Cu(12a), Ni(12a & 17), *P*(19a), *Si*(21a), V(25b).	
FERROTUNGSTEN.	Al, Sb, As, C, Cr, Cu, Mn, Mo, Ni, P, Si, S, Sn, Ti, V, W.	Al(1c), As(3a), Cu(12b), Mo(16a), Ni(12b & 17), Ti(23c).	
FERROVANADIUM.	Al, C, Cr, Cu, Fe, Mn, Mo.	Al(1c), Cu(12), Mo(16), Ni(17a) Ti(23a).	

* Where two procedures are similar, only one reference number is used. For example, aluminum in both ferromolybdenum and in cadmium alloys is determined by procedure (1a).

the local circumstances, for the photometer is used not only for trace elements but for quick checks on the base metal in alloy heats,

AUTHOR'S ACKNOWLEDGMENT

Credit for contributions to this article are given R. C. Coburn, chief chemist, and Wm. B. Goodman, nonferrous chemist, U. S. Navy Chemistry Laboratory, Munhall, Pa.

Procedure Resumes

ALUMINUM

(1) In steels:

Dissolve in aqua regia. Fume with $HClO_4$ or H_2SO_4. Dilute. Separate other elements by mercury cathode. Add buffer solution, pH 5.3 hydroxylamine hydrochloride and aluminon. Heat. Cool. Read transmittance at 525 Mμ.

Interfering elements: All but V and Ti removed by mercury cathode. Up to 2 pct Ti compensated for. Separate V and Ti by cupferron, if necessary.

References:

Craft, C. H. and Makepeace, G. R.; Ind. Eng. Chem., Anal. Ed., 17,206 (1945).

Scherrer, J. A. and Mogerman; J. Research, Nat. Bur. Stand., 21,105 (1938).

Silverman, L.; Chem.-Anal., 37, 62 (1948).

(1a) In ferromolybdenum:

Dissolve in HNO_3. Add NH_4OH and filter off bulk of Mo. Dissolve precipitate with HNO_3 and $HClO_4$. Fume. Cool and dilute. Use mercury cathode and complete as in (1).

(1b) In ferrotitanium:

Fuse with Na_2CO_3. Dissolve in H_2O. Acidify. Make $NaOH$-Na_2O_2 separation. Al is in filtrate. Acidify. Add buffer solution and complete as in (1).

(1c) In ferrotungsten:

Dissolve in HNO_3-HF. Fume with H_2SO_4. Dilute. Separate bulk of W with NH_4OH. Dissolve precipitate with HNO_3 and $HClO_4$. Fume. Dilute. Use mercury cathode. Complete as in (1).

(1d) In lead and lead base alloys:

Dissolve in HNO_3. Precipitate interfering elements with H_2S. Complete as in (1).

(1e) In magnesium alloys (low concentrations):

Dissolve in dil HNO_3. Separate Al and Fe with NH_4OH. Add buffer, etc., and complete as in (1).

(1f) In tin base alloys:

Add ZnO, HCl, HBr and $HClO_4$. Volatilize all Sn. Electroplate Cu and Pb. Add buffer solution and complete as in (1).

(1g) In bronze (by alizarin red S):

Remove Sn, Cu, Pb. Aliquot for Al, Fe, Ni. For Al, add hydroxylamine hydrochloride, alizarin red S and sodium acetate buffer. Let stand. Reduce pH to 3.5 to 3.6. Let stand. Read Al at 525 Mμ.

ANTIMONY

(2) In steels:

Dissolve in HCl-Br under water condenser. Distill Sb (As). Add oxalic acid and sodium hypophosphite. Filter As. Plate out Sb on copper spiral. Dissolve Sb in Na_2O_2. Separate CuS in alkaline solution. Fume filtrate with H_2SO_4. Add gum arabic, KI, pyridine, H_2SO_3 and H_2SO_4. Compare with standards.

Interfering elements: None.

References:

Clarke, S. G.; Analyst 53, 373 (1928).

Frederick, W. G.; Ind. Eng. Chem., Anal. Ed., 13,922 (1941), using Rhodamine B.

Freedman, L. D.; Ind. Eng. Chem., Anal. Ed. 19,502 (1947).

(2a) In copper alloys:

If alloy contains no Sn, add twice as much Sn as Sb expected. Dissolve in HNO_3. Filter off Sb, Sn, As. Dissolve and fume precipitate with HNO_3 and $HClO_4$. Add HCl, KI, sodium hypophosphite and starch. Sb (and Bi) gives yellow color. Determine Sb at 450 Mμ. Test for Bi in aliquot with thiourea and apply correction.

Interfering elements: Bi.

References:

Holler, A. C., Anal. Chem., 19,353 (1947).

(2b) In tin alloys (low concentrations):

Dissolve with HCl and H_2O_2 under water condenser. Distill As, Sb, some Sn as in (2), but complete as in (2a).

ARSENIC

(3) In steels:

Dissolve with HCl-Br under water condenser. Distill As. Precipitate As with sodium hypophosphite. Dissolve in H_2SO_4. Add molybdate reagent and stannous chloride (or hydrazine sulfate) to develop Molybdenum Blue. Determine as at 620 Mμ.

Interfering elements: None.

References:

Freeman, J. H., and McNabb, W. M.; Ind. Eng. Chem., Anal. Ed., 20,979 (1948).

Hubbard, D. M.; Ind. Eng. Chem., Anal. Ed., 13,915 (1941).

Sandell, E. B.; Ind. Eng. Chem., Anal. Ed., 14, 82 (1942).

Scherrer, J. A.; J. Research, Nat. Bur. Stand., 16,253 (1936).

(3a) In ferrotungsten:

Fuse with Na_2CO_3 and Na_2O_2. Dissolve with H_3PO_4, H_2O and HCl. Add $FeSO_4$ and HBr. Distill As. Complete as in (3).

(3b) In copper alloys:

Dissolve in HNO_3-H_2SO_4. Fume. Dilute. Add HCl and sodium hypophosphite. Heat below boiling to precipitate As. Filter on glass crucible Dissolve As with iodine solution. Add molybdate and hydrazine sulfate solutions. Complete as in (3).

Interfering elements: None.

References:

Case, O. P.; Anal. Chem. 20,902 (1948).

BERYLLIUM

(4) In steels:

Dissolve with aqua regia. Fume with $HClO_4$ or H_2SO_4. Separate most elements by mercury cathode, except Al, Ti, V, P. Separate Ti, V and most Al by tannin in acetate solution. (Excess Al may also be separated by 8-hydroxyquinoline.) Oxidize excess tannin with HNO_3. Precipitate Be with NH_4OH and quinalizarin. Filter. Redissolve in H_2SO_4 and form final color with NaOH. Compare with standards.

Interfering elements: None.

References:

Fischer, H.; Z. anal. Chem., 73, 54 (1928).

Mitchell and Ward; "Modern Methods in Quantitative Chemical Analysis," Longmans Green, New York.

Snell and Snell; "Colorimetric Methods of Analysis," Van Nostrand, New York (1936).

BISMUTH

(5) In steels:

Dissolve with HCl plus small amounts of H_2O_2. Adjust acidity to 2 ml HCl per 100 ml. Add 50 mg $CuSO_4$ as collector and gas out with H_2S. Filter, treat paper and precipitate with HNO_3 and $HClO_4$. Fume. Cool. Dilute, boil and cool. Add HCl, hypophosphorous acid and KI to produce orange or red color. Determine Bi at 460 Mμ.

Interfering elements: None (Sb correction).

References:

Sproull, R. C. and Gettler, A. O.; Ind. Eng. Chem., Anal. Ed., 13,462 (1941).

Wiegand, C. J. W., Lann, G. H. and Kalich, F. V.; Ind. Eng. Chem., 13,912 (1941).

(5a) In cadmium alloys:

Dissolve in HNO_3 and HCl. Fume with $HClO_4$. Complete as in (5).

(5b) In pig lead:

Dissolve in dil HNO_3. Boil out fumes. Add thiourea, to a yellow color. Determine Bi at 420 Mμ.

Interfering elements: None.

(5c) In lead-tin alloys:

Dissolve with HNO_3. Filter and reserve filtrate. Treat residue with HCl, $HClO_4$, HBr and ZnO to volatilize Sn, As, Sb. Combine with filtrate. Determine Bi as in (5b).

Interfering elements: None.

(5d) In silver alloys:

Dissolve with HNO_3. Add small amount of $Al_2(SO_4)_3$. Add NH_4OH in slight excess. Filter Bi, Al, Sn. Dissolve and fume precipitate in HNO_3-$HClO_4$ mix. Add 20 mg $CuSO_4$ and complete as in (5).

(5e) In tin alloys:

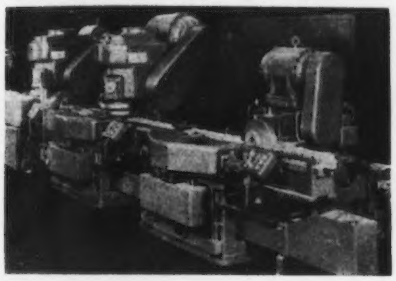
Add ZnO, HCl, HBr and $HClO_4$. Volatilize As, Sb, Sn. Precipitate Pb with NH_4CHO_2. Complete as in (5).

(Continued on page 138)

New Production Ideas . . .

Machine tools and attachments described this week include milling machines, special boring and facing machines, hydraulic presses, a rotary compressing machine, an adjustable tapping head, and a milling attachment. Pouring heaters, spray washers, a sintering and brazing furnace, scrap metal baling presses, and unit-cooled dc motors are some of the miscellaneous items discussed.

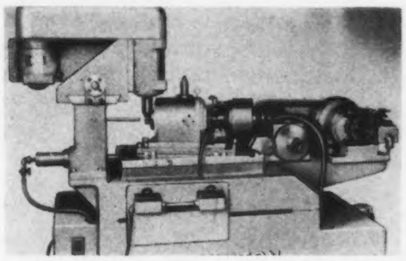
THE top, bottom and both sides of cylinder heads are milled on a new automatic transfer-type Rigidmil with three milling stations, one turn-over station, an idle



station and loading and unloading stations. All stations can be controlled from the master control button panel or individually from the station button control panels. The cylinder heads are shuttled from station to station by the return movement of the milling heads. A motor-driven chip conveyer removes the chips from the machine. All movements are automatic after the operator locates the cylinder heads on the loading station and presses the cycle start button. Each milling head has an automatic cycle of rapid approach feed and rapid return. Traveling heads are intertimed, making impossible a pile-up of workpieces at any one station. *Sundstrand Machine Tool Co. For more information, check No. 1 on the attached postcard.*

Milling Machine

A SPECIAL high-production milling machine has been designed for cutting bevel and spur gears and pinions or for work requiring slots milled on the face or OD, and requiring hex, square or a greater number of sides. The machine takes work up to 8 in. diam. The vertical spindle is mounted in anti-friction bearings and driven through V belts. The spindle unit is adjustable horizontally and vertically. The table is actuated by a combination of air and cam to impart rapid advance to and from the cutting position and to produce the proper feed for the cut. The cam can be arranged so that in feeding, a constant area of cut can be maintained to remove a constant cubic inch of stock. The work spindle swivels to mill any angle up to 90°. Spindle indexing is rapid and



timed to occur at the end of the stroke. Work is automatically ejected into a chute. *Whiton Machine Co. For more information, check No. 2 on the attached postcard.*

Electrical Wiring Conduit

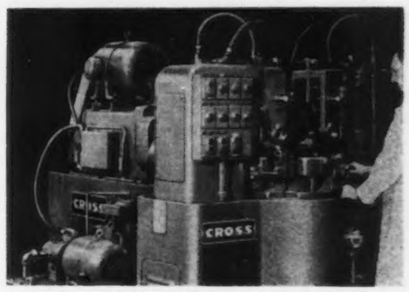
SEALTITE electrical wiring conduit consisting of flexible, galvanized steel tubing covered with a smooth abrasion resistant, moisture and oil proof protective jacket has been developed especially for machine tool builders. Sizes run from 3/8 to 2 in. Easy to install and keep clean, Sealtite conduit is furnished in long lengths that are cut and assembled by the user. *B. F. Goodrich Chemical Co. For more information, check No. 3 on the attached postcard.*

Solid Carbide Reamers

SOLID carbide reamers are now produced with an odd number of flutes and a radius relief chamfer, with all lands lapped. The reamers are available in 1/16 to 1 in. diam. The smaller reamers are made of solid carbide rod; the larger reamers have solid carbide heads brazed to steel shanks. *Atrax Co. For more information, check No. 4 on the attached postcard.*

Automatic Special Machine

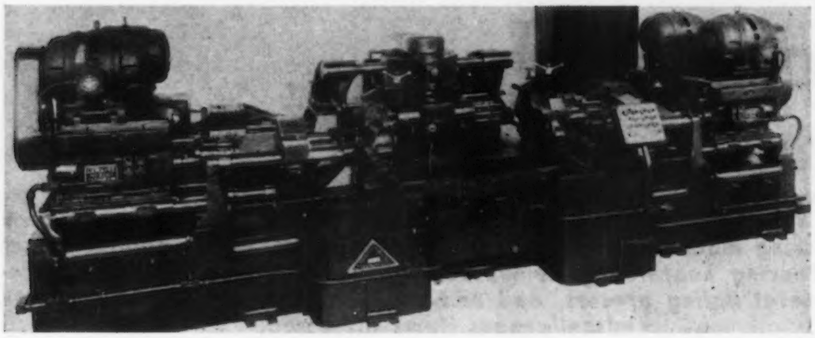
A NEW special machine automatically bores and faces side gear pockets of differential cases. The unit was designed to produce 100 pieces per hr at 100 pct efficiency. It is an automatic cycle unit, the operator merely loading and unloading the parts and pressing the cycle button. One unskilled operator can handle two machines.



Flexibility for reasonable product design changes is provided through the use of standard Cross units, permitting quick interchangeability and easy maintenance. Other features include hydraulic feed and hardened and ground steel ways. *Cross Co. For more information, check No. 5 on the attached postcard.*

Boring-Facing Machine

A SPECIAL two-way 42-spindle horizontal machine with a shuttle fixture has been designed to rough and finish bore large hole, face ends, drill and ream bolt holes from the outside and spotface bolt holes from the inside on a truck axle. The machine has a fabricated steel base with two side bases each



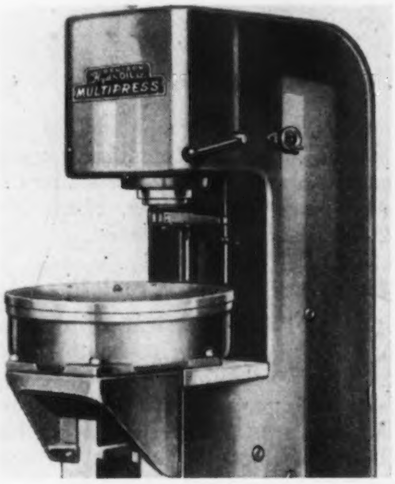
supporting two No. 5000 twin ram units. The center base carries the three-station shuttle-type fixture and special rear drilling unit used in spotfacing holes from the inside of axle ends. One feature of the machine was the necessity of angling all outside units down 1° and providing a center rear unit mounted on bars that would spotface at 1° up from horizontal feed to the left, would tilt to 1° up from horizontal in the opposite direction and feed to the right. By means of an auxiliary hydraulic cylinder a pilot for the boring tool is carried through the hole to be bored and enters a pilot bushing. The feed of the unit rough and finish bores the large hole, bringing into position a special cross facing tool. Continued feed causes single point tools to feed across the face. Three of the tools perform rough, semifinish and finishing cuts. The electrical equipment carries the work automatically through the entire machine cycle after the part has been clamped in place and the cycle button is pushed. Production is approximately 10 axles per hr. *LeMaire Tool & Mfg. Co. For more information, check No. 6 on the attached postcard.*

Compressed Air Separator

THE Paragon C separator removes the last traces of oil, moisture and dirt from compressed air at the point of use. Installed in the pipe line ahead of the point of delivery, air enters the unit at the top and is conducted to an expansion chamber below the strainer cartridge, where expansion and surface contact separates air and moisture. The air then rises slowly through two absorbent pads, tightly packed between perforated brass baffles. The pads trap oil, grit and moisture, and the dry, clean air is delivered to use. Separated moisture descends by gravity to a moisture collector. The unit is offered in two sizes: $5\frac{1}{4}$x$8\frac{1}{2}$ in. overall, accommodating inlet and outlet pipes of $\frac{1}{8}$ to $\frac{3}{8}$ in., delivering to one $\frac{1}{8}$ in. pipe nozzle only. Size No. 2 measures $6\frac{1}{2}$x$8\frac{1}{2}$ in. overall, accommodating pipe of $\frac{1}{8}$ to $\frac{3}{4}$ in., delivering by manifold to four $\frac{1}{8}$-in. pipe nozzles or to two $\frac{1}{4}$-in. pipe nozzles. *James A. Murphy & Co. For more information, check No. 7 on the attached postcard.*

Hydraulic Press

FAST action with high-tonnage pressures under regulative control are operation advantages of a new 25-ton oil-hydraulic press. Precision adjustments for multiple ram actions give flexibility of application in varied industries. This



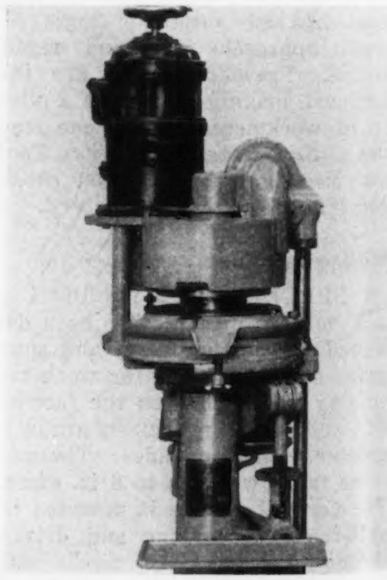
Multipress has a 15-in. stroke, 25-in. daylight opening, and a 12-in. throat depth. Approach speed of the ram to work is variable and can be preset at any speed up to 530 ipm. Ram stroke length, pressing speed and ram pressure can also be preset. Uniform pressure application for every work cycle of the ram is obtained regardless of dimensions of parts being processed. Controls may be dual hand lever, single lever, foot pedal or electric pushbutton. It can also be operated with automatic valve controls for single or continuous cycling, or vibratory repeat strokes. A 33-in. diam hydraulic index table may be installed providing indexing for either 6 or 12 stations. The adjustable characteristics of the press permit unskilled operators to turn out production quality parts at full speed. *Denison Engineering Co. For more information, check No. 8 on the attached postcard.*

Quick Exhaust Valve

A NEW auxiliary air valve enables cylinders to start their return stroke in a minimum of time. The unit acts as a supplementary exhaust to the regular operating valve. When the latter is in open position and starts to exhaust, it automatically causes the self-containing dumping valve, mounted at the cylinder, to dump the exhaust air, thus starting the cylinder's return trip almost instantaneously. *Ross Operating Valve Co. For more information, check No. 9 on the attached postcard.*

Rotary Compressing Machine

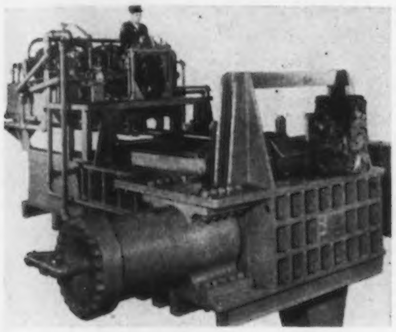
A SPECIAL, high speed rotary compressing machine handles abrasive materials such as powdered metals, glass, and ceramics. Compressed parts up to ½ in. diam can be produced at rates up to 300 parts per min. A wide assortment of shapes and sizes and parts having cored holes can be produced. With a 1 hp gear-head motor, mounted vertically above the die area of the press, the possibility of abrasive material working into and damaging the motor is eliminated. Special guards protect the upper punches



from excessive wear. The press applies up to 2½ tons pressure from above and below simultaneously. *F. J. Stokes Machine Co. For more information, check No.* 10 *on the attached postcard.*

Scrap Metal Baling Presses

A NEW scrap press that turns out high density bales of 600 to 750 lb each at the approximate



rate of 7½ tons per hr has a charging box 100x58x35 in., delivering a finished bale 16x18x35 in. Operating power is provided by two 75 hp electric motors. Hydraulic equipment features Vickers pumps and control valves and Meehanite hydraulic cylinders. The press is equipped with the new box type ejector. A skip pan loader of 4 1/3 cu yd capacity, permits preparation of a charge while the press is baling. *Dempster Bros., Inc. For more information, check No.* 11 *on the attached postcard.*

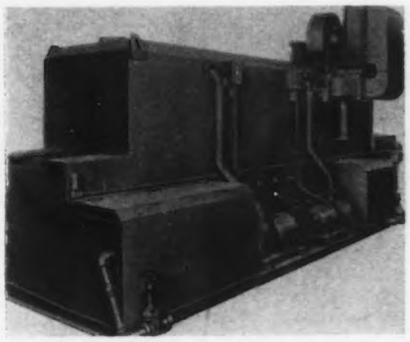
Pouring Heaters

TWO new models in the line of Cerro alloy pouring heaters, designed with specific heating requirements of the low melting point alloys, have capacities of 3 and 20 gal. These pouring heaters, con-

structed with a heavy pressed steel inner pot in a sheet metal housing, will not contaminate the alloys. The Sta-Warm method of electrical heat, that produces low heat concentration and even heat distribution, plus the selective temperature control in the range of 100° to 300°F, prevents overheating and eliminates the necessity of water jackets. The pouring valve is locally heated to prevent freezing of the alloys as they are poured. Leg mounting is optional and a mounting for sling use for movable units is available. *Sta-Warm Electric Co. For more information, check No.* 12 *on the attached postcard.*

Spray Washer

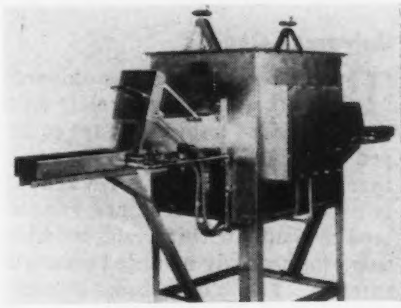
NEW washers for metal parts feature standardized construction so that multiple wash, rinse and dry stages may be incor-



porated at any time. The machines are single or double spray-zone-units and may use alkali cleaning compounds or be converted to handle compounds that foam excessively. The work is pressure-sprayed from rigid multiple spray heads. Spray nozzles may be directed to any given point—top, bottom and sides. Spray heads have removable plugs for easy cleanout. The spray off-fall is directed by shed plates through removable mesh chip baskets into a settling sump, then through screens into the main tank where the solution is heated by steam coils before recirculation. The blow-off stage may be steam or gas heated or built to give cold-air blast. *Detrex Corp. For more information, check No.* 13 *on the attached postcard.*

Electric Furnace

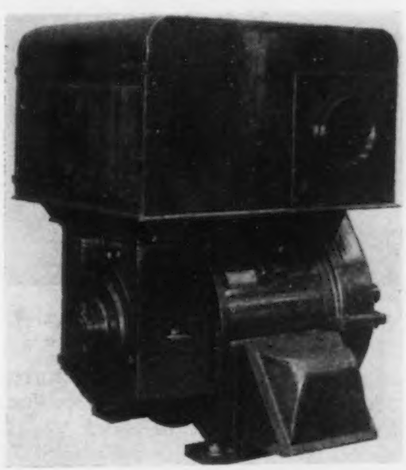
DESIGNED for sintering powdered metals, brazing, bright annealing and for many metallurgical research uses, a new electric furnace, model SNX, has a normal heat range of 1400° to 2500°F, flash firing to 2750°F. The unit is a manual pusher type Globar element furnace, designed for batch treatment on a straight line and has a three-zone system. The work moves from the purge, or preheat chamber, through the high temperature area, and then through the water-cooled, cooling zone. The counter-balanced doors are equipped



with automatically operated flame curtains to prevent contamination of the furnace atmosphere when open. The furnace has a high temperature zone area of 4x4x12 in. Maximum power input is 15 kw. *Pereny Equipment Co. For more information, check No.* 14 *on the attached postcard.*

Unit-Cooled DC Motors

TOTALLY-ENCLOSED, unit cooled dc motors in ratings up to 200 hp are available with a new type cooling assembly that enables them to operate at slow speeds for long periods of time. Two blowers, driven by a single Tri-Clad induction motor, in the air-to-air cooling assembly provide ventilation independent of motor speed. One blower circulates internal air through the motor and unit cooler, the other blows external air through the cooler. Full torque is possible down to almost zero speed continuously. The unit cooler is built of pressed-



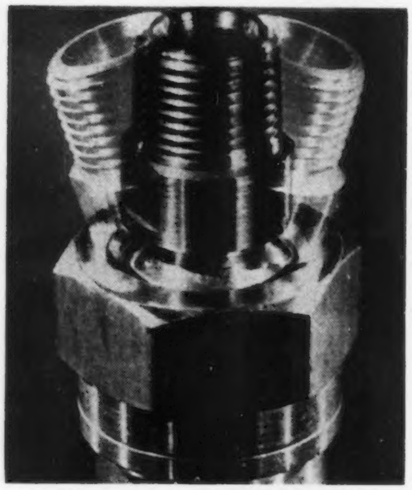
steel sheets that have been stacked and welded together at the edges to provide alternate air passages at right angles to each other. Designed for operation in dusty, dirty, and oil-laden atmospheres the motors require no piping, duct-work, air filter, or pressurized air supply. *General Electric Company. For more information, check No.* 15 *on the attached postcard.*

Universal Chucks

THREE new three-jaw universal chucks will screw directly on to the spindles of lathes that are equipped with 1 in., Nos. 8, 10, or 12 threaded spindle noses. No adapter is needed. The chucks are guaranteed to center within 0.003 in. when new and properly mounted on a true spindle. The chuck body is semisteel. Each chuck has one set of reversible jaws. *Westcott Chuck Co. For more information, check No.* 16 *on the attached postcard.*

Swivel Ball Joint Coupling

A NEW coupling features a swivel ball joint that will turn 20° in any direction with no restriction of flow regardless of angle. The coupling will absorb vibration and movement in all installations where pipe cannot be rigidly supported. Leakage and drip are eliminated by the O-ring principle that provides a positive seal at any pressure; the greater the pressure, the tighter the seal. The standard ⅜ in. swivel ball joint is good for pressures from ¼ oz to 150 psi and



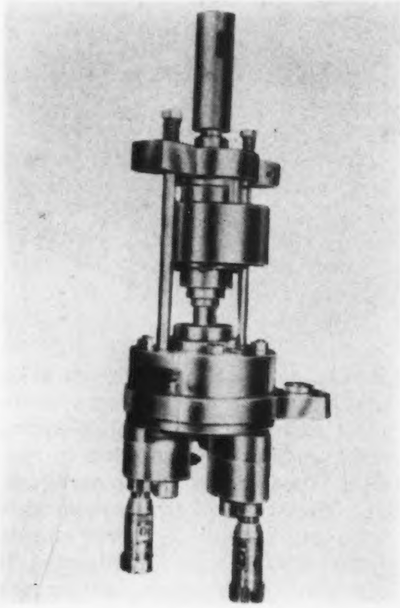
for temperatures up to 350°F. Models for any size pipe and for higher pressures and temperatures are available. *Kelite Products, Inc. For more information, check No.* 17 *on the attached postcard.*

Tap Holder

THE newest Tool-flex tap holder for close-center, multiple tapping operations will tap up to No. 10-24 NC threads in steel, at ⅞ in. center distances. The Neoprene mounting compensates for both parallel and angular misalignment and prevents broken taps, bellmouthed and torn threads. This self-centering holder features short overhang, shanks to customer specifications, oil resistant Neoprene mounting and is made of high grade steel, heat treated and ground. *Burg Tool Mfg. Co. For more information, check No.* 18 *on the attached postcard.*

Adjustable Tapping Head

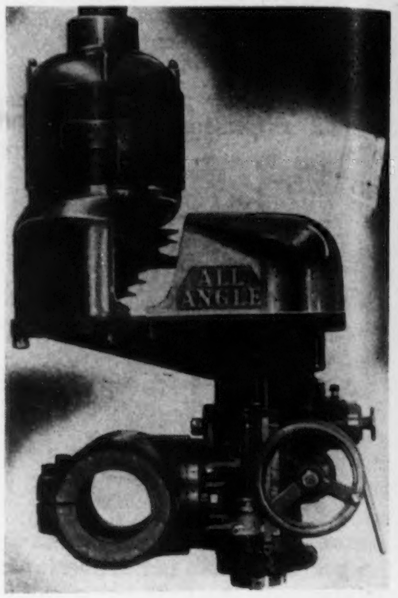
A NEW tapping head that features a wide range of adjustment is fully geared with needle



bearings on all spindles and ball thrust bearings throughout. All parts are fully enclosed for pressure lubrication and protection. Nonslip positive clamping is on the adjusting members. The case is sand cast aluminum. The tapping head is supplied with three spindles for equal adjustment in line and 3, 4, 5, or 6 spindles for equal adjustment on bolt circles. *Errington Mechanical Laboratory, Inc. For more information, check No.* 19 *on the attached postcard.*

Milling Attachment

A NEW type 4 milling attachment is precision built for use on intricate jobs. A 1½ hp motor supplies power for precision high-speed carbide cutting, and all-angle flexibility permits work at different angles without changing the work setup. The unit is equipped with



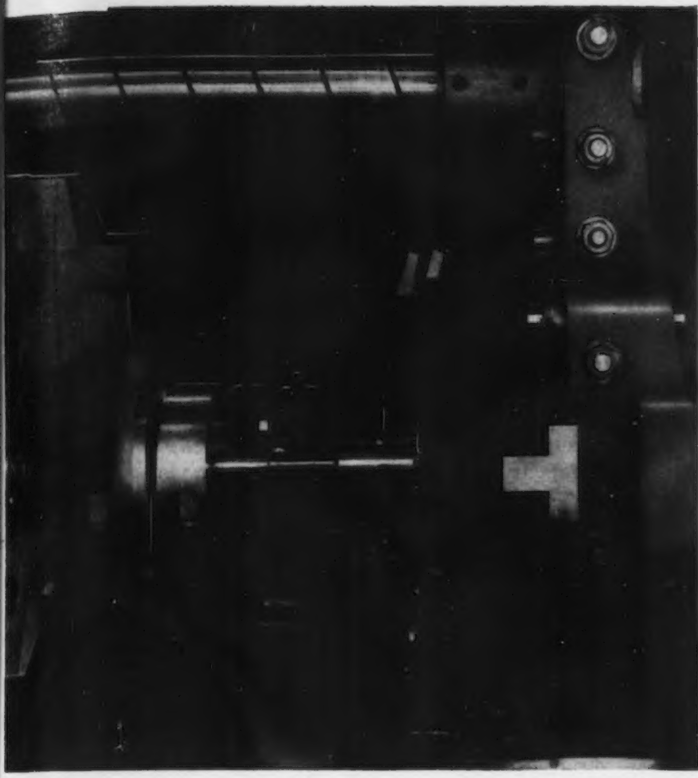
precision bearings. A positive direct drive and planetary back gear giving 3:1 reduction is provided through an involute 14 tooth spline drive that transmits uniform power without side-pull. The attachment features heat-treated alloys in all driving parts and is built for milling, drilling, boring and grinding. *Fray Machine Tool Co. For more information, check No.* 20 *on the attached postcard.*

Air Exhaust Muffler

DISPERSEMENT of sound from released compressed air is accomplished safely and quietly with the new air exhaust muffler called the Atomuffler. Its principle of radial flow effectively eliminates the concussion that accompanies the discharge of compressed air without retarding the performance of the air mechanism. It prevents discharging the oil and water vapor on the operator or surrounding area. The Atomuffler is made in pipe sizes ⅛ to 1½ in. *Allied Witan Co. For more information, check No.* 21 *on the attached postcard.*

Lifting Magnet Controller

FOR use with large circular lifting magnets and heavy-duty rectangular magnets, a new magnet controller features an automatic discharge that is adjustable to suit size of magnet, material handled and voltage variations up to 10 pct



RIGIDITY typical of *tooling by P&J*

Speed in the roughing and fine finishing of the spherical seat of this casing is based on the extremely rigid setup of the radial ground form tools. The 6-DRE's lowest feed of .007", with a speed of 55 fpm, is used to obtain the final smoothness and accuracy. Material: Bellmaloy, Brinell 179 to 207. Tooling: Tungsten Carbide.

Twenty-seven operations on a differential case in 9.6 minutes, floor-to-floor, with the P&J 6-DRE. Profitable? Of course it is . . . with P&J Automatics tooled by P&J!

Potter & Johnston tool engineers are expert at tooling up these powerful machines and coming up with record floor-to-floor times. Get a P&J estimate by sending a sample of your work . . . there's no obligation.

SEQUENCE OF OPERATIONS FOR FULL AUTOMATIC CYCLE AS TOOLED BY P&J

1st TF — Rough bore 2 dias. Face seat. Rough form spherical seat. Bore dia. Rough turn 2 dias. Rough face flange. Face end.

2nd TF — Finish above operations. Chamfer.

3rd TF — Finish face seat. Finish face end.

4th TF — Ream. Size bore. Size turn 7.625" dia.

5th TF — Finish form spherical seat. Finish face seat. Face end.

6-DRE AUTOMATIC

Potter & Johnston Company

Pawtucket, R. I.

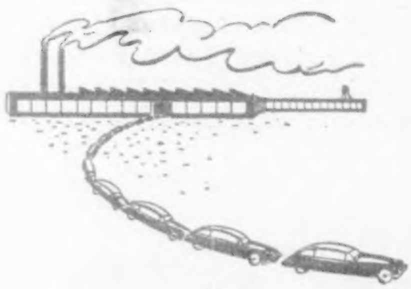
subsidiary of Pratt & Whitney Division Niles-Bement-Pond Company

P&J

Assembly Line . . .

WALTER G. PATTON

• Packard offers car buyer a new automatic transmission . . . Efficient new mechanism is a torque converter type . . . Speedup charges hurled by union leaders.



DETROIT — George T. Christopher, president and general manager, announced this week what Packard engineers say is the first automatic transmission that will give the driver "more miles per gallon than the same car with conventional drive."

Announcement of its "Ultramatic Drive" climaxes 16 years of engineering and development work by Packard engineers on a self-shifting device that is "simple, smooth, thrifty and quiet—yet more responsive, more positive and more flexible than any other transmission yet produced."

The unique feature of the new Packard transmission unit is that a torque converter is used while the car is accelerating; however, when the car reaches driving speed the device locks into mechanical drive for cruising.

To put it another way, the Packard transmission does not operate through a fluid coupling in high gear. When the car is in cruising gear, the drive is mechanical just as it is in the present transmission.

Another feature of the new transmission is its ability to "hold on" until the car decelerates below 10 mph, thus minimizing any tendency to slip back into converter drive in slow traffic.

Packard's claims to unusual flexibility in its new drive appear to be amply justified. When the driver wants a "jack rabbit" start, it is merely necessary to press down hard on the accelerator. Under these conditions, the positive connection between the engine and the rear wheels may not be established until a speed of 55 mph is reached. However, if the driver momentarily releases the pressure on the accelerator at any point between 15 and 55 mph the unit shifts at once into positive, direct drive.

Excepting the positive mechanical drive, the new Packard unit has a number of points in common with the Buick Dynaflow. Neither has a clutch pedal. Each uses a torque converter unit for acceleration although the Buick unit has five rotating elements whereas the Packard transmission has only three rotating members.

Without going too deeply into the engineering or mechanics of the new transmission, it may be explained that the direct clutch in the Packard transmission is acted upon by the hydraulic system. Movement of the piston activating the clutch is controlled either by a governor or by pressure on the accelerator pedal. The governor is set to operate at 15 mph. However, if the pressure on the accelerator exceeds the force of the governor, the torque converter will continue to function until a speed of 55 mph is reached. At this point, the governor takes control, regardless of the foot pressure on the accelerator.

THE Packard converter unit consists of four members, three of which are free to rotate. These units are the converter pump, the first turbine, a converter reactor and a second turbine.

Behind the converter unit is a gear arrangement similar in many respects to the Buick design. This unit contains a low and a reverse planetary gear set, a reverse brake and front and rear oil pump. A parking member is also incorporated in the gear assembly.

Packard engineers claim to have the most positive and rapid response to the accelerater yet devised. It is possible with the new unit, for example, to rock the car back and forth even more rapidly than can be done with a conventional transmission unit. As those who have driven cars equipped with the new transmission can testify, there is no hesitation in the response of the controls.

Since there are no gears to be shifted, there is no lag in acceleration. Packard engineers also claim that many involuntary "down shifts" on slippery pavement or in slow-moving traffic are avoided. Because the driver has his car in direct, "no-slip" drive a larger percentage of the time, it is argued, gasoline wastage due to slippage is minimized.

The only electric element in the new Packard "Ultramatic Drive" is a switch lever that permits engine starting only when the control lever is in the "parking" or "neutral" position.

As in the case of the Buick Dynaflow, Packard will provide water cooling for the new transmission. Several of the units already tested have operated successfully without water cooling, but the decision has recently been reached to add a water cooling unit to the new transmission.

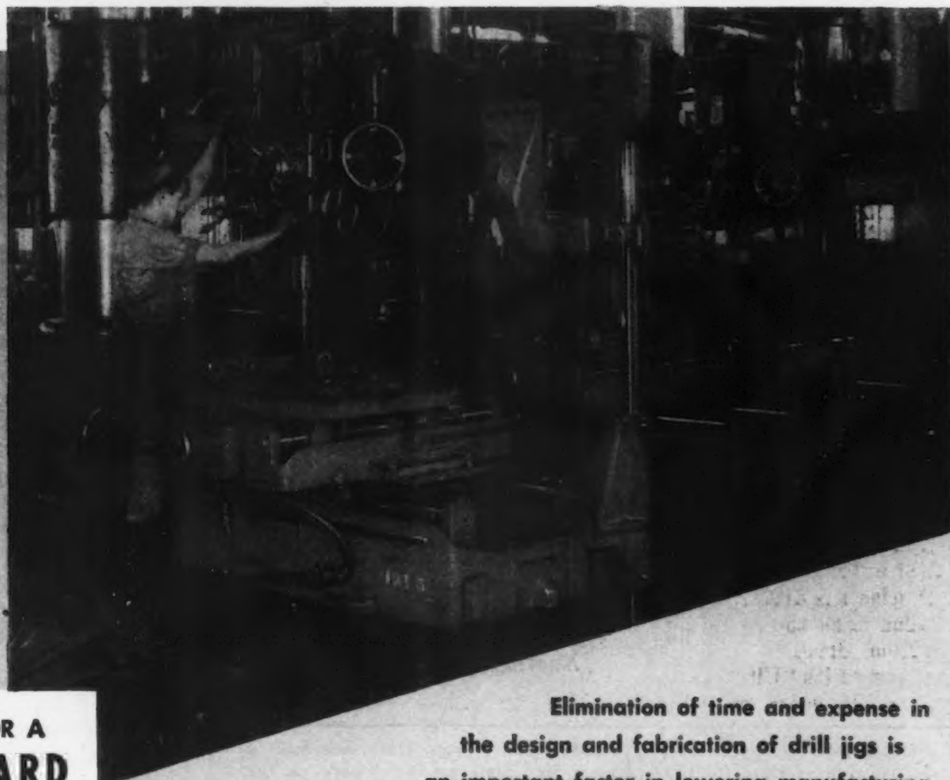
Announcement of the new transmission was made simultaneously with the introduction of Packard's new Golden Anniversary models.

NO major body changes have been made, but Packard engineers are claiming 77 engineering improvements and dozens of minor changes. More than 5000 of the new models have already been produced, bringing the Packard

THE **PRICE** OF — **BULLARD SPACERS**

FROM THE COST OF JIGS

From 40 to better than 50% Operational Savings shown in Case Histories



ASK FOR A BULLARD SURVEY OF YOUR JOBS

•

WRITE FOR BOOKLET (INTER-SP-1)

Elimination of time and expense in the design and fabrication of drill jigs is an important factor in lowering manufacturing costs. Maintenance and handling of jigs are also NON-PRODUCTIVE operations.

The investment in a BULLARD SPACER is quickly absorbed . . .

QUOTE FROM ONE USER: **"We have completed some forty (40) different jobs. The amount of pieces of each job is about thirty (30). The cost of making jigs for each one of these jobs would amount to, from $300 to $500 per jig, plus special cutting tools to be used with jig drilling and boring."**

THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT

production total over the 50-year period of its existence to more than 1,200,000 automobiles.

Packard's new Golden Anniversary model will go on display in showrooms throughout the country early in May. A mass drive-away of 2000 gold-painted cars from Packard's 504-acre proving ground near Utica, Mich., will be held May 3.

Packard has set its production for the year 1949 at approximately 130,000 units or 30 pct more than the 98,897 cars produced in 1948.

Packard's Golden Anniversary was the occasion for recalling some of the accomplishments of the firm during its half century of existence. The first Packard was built in 1899 at Warren, Ohio. The company moved to Detroit in 1903. A 1901 model Packard was the first automobile in the country to substitute the steering wheel for the tiller. Packard was the first American company to offer straight 8 L-head engine and a V-type 12 cylinder engine. It was the first to build a 1000-hp aircraft engine.

As in the case of early Ford Motor Co. investors, Packard stockowners have been well rewarded. For example, one original investor gambled $5,000 on the Packard company. From this investment the stockholder now has 116,500 shares of Packard stock. From total cash paid into the company of $525,000, Packard has earned profits of $192 million.

Signs of Labor Unrest In Automotive Industry

South Bend

• • • **The auto industry,** with adequate supplies of raw materials for almost the first time since the war, now has a severe case of labor unrest. Last week, 7500 Bendix workers walked out in protest against an alleged "unreasonable speedup." The workers had just returned to the job after an 8-day strike. About 12,000 Nash workers have already been laid off as a result of the dispute. GM and Studebaker supply lines were reported threatened by the stoppage.

Meanwhile, a slowdown of 190 workers on the Packard final assembly line caused 3500 Packard workers to be sent home. Reports indicated that workers were taking 10 minute "breathers" every hour while ventilation fans were being repaired. Union sources blamed the dispute on some gold paint being used on Packard's new anniversary models and lack of adequate ventilation.

This week Ford workers are voting on a strike authorization charging "speedup." A strike vote has already been taken at Lincoln-Mercury Div. Management has insisted that the assembly line tempo has not been increased although reasonable efforts have been made to improve the efficiency of the workers.

Another labor development being watched here is the NLRB election on May 3 to determine whether Lincoln-Mercury office workers will be represented by UAW-CIO office workers department. This climaxes a campaign by the union extending over more than a year. The Ford umpire has ruled that approximately 300 out of 1200 L-M workers are eligible to vote. Disqualified from voting are all workers handling confidential material who are considered to be a part of management. If the union wins the election, it is expected that a similar drive on Ford office workers will be undertaken. The union plans eventually to unionize all eligible office workers in the auto industry.

•

SLIDE FOR LIFE: *Goodyear Tire & Rubber Co., Akron, Ohio, has built a special road for testing its tires. The driver jams on the brakes on the flooded slick surface. The fifth wheel, shown on the left side of the skidding automobile, operates instruments which measure the length and severity of the skid. Another instrument mounted in the rear measures the skid-resistance of the tires.*

Briggs Profit Record

Detroit

• • • **An all-time record** sales volume and net profit was established in 1948 by Briggs Mfg. Co., according to a recent report to stockholders by W. D. Robinson, president. Robinson reported net sales of $265,900,438, an increase of $61 million over 1947. Net profits increased $3 million, aggregating $10,516,623. Profits per share rose from $3.86 in 1947 to $5.40 during 1948.

With steel in better supply, Briggs anticipates even greater production records during 1949, Robinson told the company's stockholders.

Excepting for the war years, Briggs' employment was at an all-time high, reaching 29,671 in 1948. He said the company lost 11 million man-hours of production through work stoppages and absenteeism in its plants and those of suppliers during 1948.

•

Great Lakes Adds Ovens

Duluth

• • • **Great Lakes** Steel Corp. is adding eight ovens each to batteries Nos. 1 and 2 of its ovens built in 1938. The extended batteries will then have 73 ovens each.

Contract for the 16 additional ovens has been placed with the Wilputte Coke Oven Div. of Allied Chemical & Dye Corp.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Washington . . .

EUGENE J. HARDY

• Military aid close to $1.5 billion... Large portion to come from Army stocks . . . Heavy steel traffic increases truck accidents... ICC investigation under way . . . FTC starts steel price study... More comprehensive than any previous job.

WASHINGTON—The possible impact on American industry of an arms lend-lease program for Western Europe has been difficult to measure up to this time, primarily because of the lack of adequate information concerning the actual amount of money that will be appropriated for this purpose.

However, Secretary of State Acheson has now laid the general administration program before the Senate Foreign Relations Committee. It would require appropriations totaling nearly $1.5 billion. This provides about $1.1 billion for the North Atlantic nations plus an additional $350 million for other friendly nations including Turkey and Greece.

This amount keeps well within the $7 billion limit which top-level State Dept. officials had previously set for all types of aid to Europe in the coming fiscal year. Congress has already authorized, but not yet appropriated, approximately $4.3 billion for continuing the Marshall Plan for another year—bringing the proposed now to about $5.8 billion.

It was been generally assumed that a substantial portion of any military aid would come from current stocks of military equipment in the depots and warehouses of the U. S. Army, thereby lessening the total value of contracts that would find their way into the hands of industry. This assumption is quite valid, but up until a few weeks ago there has not been any concrete evidence as to just how much in the way of guns, tanks, ammunition and other munitions could be made available from U. S. stocks.

At the present time, the Army has approximately $3 billion worth of all types of equipment requiring overhaul and repair. It is estimated by Maj. Gen. William D. Reeder, Deputy Director, Logistics Div., U. S. Army that probably as much as 50 pct of Europe's needs could be filled from this $3 billion stockpile. General Reeder told Congress that if $1 billion worth of arms were to be shipped to Europe about "$500 million, probably, half of it, could be found in that category." It would cost an average of about 20¢ on the dollar to rebuild this equipment, according to General Reeder. There is also a considerable quantity of equipment in good condition that could be shipped to Europe.

Industry would undoubtedly share in the contracts for repair and rebuilding and, in addition, would probably receive contracts to replace Army equipment sent to Europe, as well as contracts for something in the neighborhood of $1 billion for new equipment.

* * *

GREATLY expanded transportation of steel products by motor truck, resulting largely from higher rail rates and the switch to f.o.b. mill selling, is beginning to boomerang for the steel companies. Safety factors are the primary reasons. The Interstate Commerce Commission has received complaints from Ohio, Indiana, Michigan, and Pennsylvania, relative to the danger to drivers and public from the shifting of loads of steel on truck and trailer bodies.

Accidents, fatal and nonfatal, in which steel haulers were involved, have risen substantially and in recent months the reported accidents have more than doubled. As a result, the Section of Safety, Bureau of Motor Carriers, ICC, has been conducting an informal investigation into the matter.

The first step was an investigation in Pittsburgh several weeks ago. ICC officials visited several plants of Carnegie-Illinois and Jones & Laughlin and talked with traffic representatives of these firms. On-the-spot checks of loading and handling revealed that steel firms paid little attention to loading or adequate securing of the load. Overloading was of monstrous proportions and it appeared that steel traffic people would load anything the carrier would take. In addition, ICC officials in the Chicago office have been talking with steel haulers.

ICC officials hope to talk over the problem with the Traffic Committee of the American Iron & Steel Institute in the near future. The need for further regulation will be explored, but it is likely that the situation can be ironed out within the scope of existing rules. Primary attention will be directed to loading, securing of loads, and the adequacy of existing motor trucks to handle the increasingly heavy steel loads.

* * *

THE Federal Trade Commission has embarked on an economic analysis of the price structure of the steel industry. It is to be based on price information obtained for use in the legal proceedings involving the commission's current price-fixing conspiracy charge against the steel industry. The job is being directed by Corwin Edwards, head of the Commission's Division of Industrial Economics, who states that the study will "supply a more complete and accurate account of the nature of steel prices than has ever before been available."

This is far from an understate-

ment since the commission's economic analysts now have before them what is probably the greatest mass of factual data on steel prices that has ever been collected. It will be remembered that in the early stages of the current steel case steel producers submitted to the commission's attorneys all available price data, including both base prices and extras, for the period beginning with the demise of NRA in 1935 through the end of 1947.

Dr. Edwards pointed out to THE IRON AGE that completion of the study is very much a distant objective, depending primarily on the speed with which the legalities of the conspiracy charge move along. There will be considerably more economic data on prices entered into the record when the steel companies present their defense and Dr. Edwards wants to have all available data on steel prices included in the economic analysis. This means that the study cannot possibly be completed until the Commission is ready to rule on the case or dismiss it, which might not take place for another year. Dr. Edwards further told THE IRON AGE that this study should prove to be of considerable value to the steel consuming industry as well as the steel producing industry, since for the first time it will present an overall picture of the pricing practices of the nation's basic industry.

Thus far, the work has proceeded slowly. An analysis and comparison of extras has been almost completed. A similar analysis and comparison of base prices for the early years of the period covered is under way, but is nowhere near complete.

Describes Bureau Of Mines Investigation Of Manganese Deposits

Washington

• • • **Reserves** of metallic manganese in the Missouri Valley of South Dakota are estimated at more than 12 million tons, but treatment and commercial use of the low-grade deposits containing this manganese so far has proved uneconomical under present industrial practices, according to the first of three publications on manganese deposits in the Missouri River Basin recently released by the Bureau of Mines.

An extensive investigation to determine the extent, grade and character of manganese deposits on both flanks of the Missouri River Valley and its major tributaries in South Dakota was made by the Bureau of Mines in 1945-47. Large reserves were found, but Bureau pilot-plant tests indicated that the ores could not be upgraded economically to the point where they would meet industrial requirements.

A part of the Missouri River Basin Development Plan, this Bureau investigation was made in cooperation with other Interior Dept. agencies. Extensive mapping and drilling operations—238 holes totaling 14,176 ft—are described in the report just released. Forthcoming publications will cover experimental mining and pilot-plant tests.

Describing in detail test drilling, stratigraphic studies, outcrop surveys, and other work on the project, the publication was prepared by Paul Zinner, chief, Mining Branch, Minneapolis; Edward L. Tullis, Bureau minerals technologist, Rapid City, S. D., and Paul E. Pesonen, former Bureau mining engineer.

THE BULL OF THE WOODS BY J. R. WILLIAMS

Uses Accounting Principles

Washington

• • • **Accounting principles** to be used in determining what business performed under military contracts is subject to renegotiation, and the costs which may be allowed under such contracts, have been made public by the National Military Establishment.

These principles are given in Part 423, of the Military Renegotiation Regulations, which is the third part of the regulations to be issued under the Renegotiation Act of 1948.

In issuing Part 423, the Board stated that the principles and procedures of the Renegotiation Act of 1944, as amended, were followed in so far as they apply to present economic conditions. Studies are under way to determine the necessity for changes in the application of the 1948 Act in the light of new conditions.

West Coast

ROBERT T. REINHARDT

• Freight allowances by Kaiser makes most of its prices competitive in largest market areas, but no concessions made on sheared plates.

SAN FRANCISCO—If any further evidence of the return of the competitive era in steel marketing was needed, Kaiser Co., Inc., provided it last week with the announcement that freight allowances as high as 99 pct would be made.

Freight is being absorbed on structural shapes, carbon bars, alloy bars, hot-rolled strip, hot-rolled sheet and cold-rolled strip as shown on the accompanying table. In no instance is freight being absorbed on shipments of sheared plates. In the Los Angeles area, freight allowances range from nothing to 25 pct; in San Francisco from 59 to 84 pct; in Seattle from 85 to 99 pct, and in Spokane from 36 to 48 pct.

It will be noted that the heaviest allowances, percentagewise, appear to be on hot-rolled sheet and hot-rolled strip.

It is apparent that Kaiser Co. has thrown down the gauntlet of competitive prices on most of its products in its marketing territory of the West and apparently believes it is acting well within the legal interpretations of the Supreme Court ruling which brought about the abandonment of the basing point system.

Spokesmen for the company point out that they are acting completely independently to meet competitive prices in order to continue to move the company's products as the demand declines.

Here is how a customer for structural shapes in San Francisco fares under the freight allowance program: Previously he would have had to pay $4.1193 per 100 lb for this material delivered to him here and now he will pay only $3.8713 thus saving $0.248 per 100 lb. By comparison the base price for structural shapes of Geneva Steel Co. of $3.25 per 100 lb plus freight of $0.621296 this company's steel can be laid down for almost identically the same price. In Los Angeles under the new absorption program a shape user can get his steel from Kaiser for $3.8714 per 100 lb which again is practically identical to the Geneva price when freight is added. Kaiser lopped off $0.011 by absorbing freight here. However, up in Seattle Kaiser chopped off $0.8071 per 100 lb where the buyer will have to pungle up $3.9463 per 100 lb as against a practically identical cost for Geneva produced steel.

Carbon bars present a similar picture. In San Francisco the customer picks up approximately $0.1869 and will pay $4.1324 per 100 lb which is almost exactly the same cost he would bear if bars were purchased from the Pittsburgh plant of Columbia Steel at $4.05 per 100 lb plus $0.0864 freight. It appears that Los Angeles customers for carbon bars are already getting this product from the Kaiser Co. at a figure slightly below bars produced by Columbia at Torrance.

In a 4 to 4 decision (Justice Jackson not voting) the Supreme Court this week affirmed the opinion of a court of appeals holding the use of basing points in the Rigid Steel Conduit industry to be a violation of the Federal Trade Commission Act. *(See p. 121)**—Ed.*

In Seattle, Kaiser is offering real competition in bars having announced enough freight absorption to permit the customer to purchase there at $4.125 per 100 lb, whereas bars delivered from the Pittsburgh plant of Columbia would cost a buyer $4.674. However, carbon bars are produced in both Seattle and Portland and Kaiser's price is apparently designed to meet that local competition.

LATE last week no other western producers indicated that they would follow in Kaiser's footsteps and anything like a hot price war seems remote. This latest move by Kaiser Co. is being interpreted by purchasing agents as an attempt to get into the competitive price bracket above which it has hovered for many years. Needless to say the trend is welcomed by purchasing agents, several of whom have expressed the hope that from now on they could count on this supplier as a source with competitive prices.

It is no secret that the Kaiser organization has been criticized for what has variously been termed as a "vascillating policy," and "contributing to the uncertainty of buying." Western steel users who heralded Kaiser's entrance into the steel business because they felt it would bring about "more realistic prices" and then were disillusioned by the $30 per ton hike of last August, are now taking encouragement from this latest move and believe that their original faith in the independent Kaiser operation has been justified.

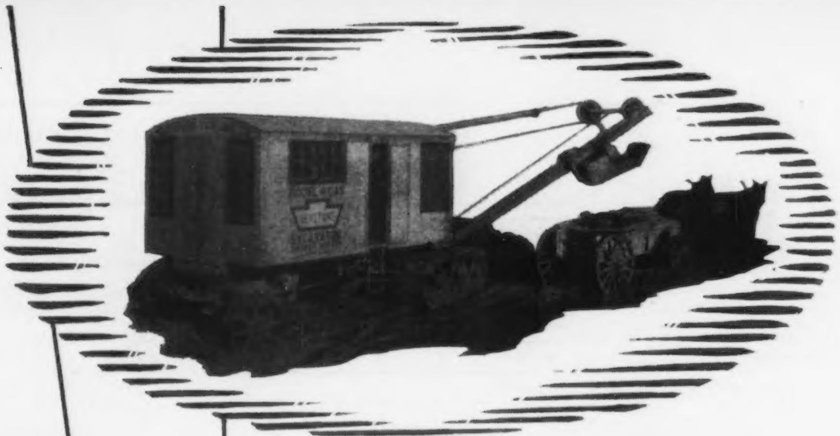
There is some reason to believe that this move of the Kaiser Co. to allow at least part of the freight in the face of the recent Supreme Court decision, may encourage other steel companies to do likewise. As was reported last week in THE IRON AGE there are indications that already eastern producers are quietly making such allowances.

Kaiser Co. is further strengthening its central office in Oakland by bringing there F. M. Rich, vice-president in charge of operations who has formerly been located at Fontana. This change was made, according to Jack L. Ashby, vice-president and general manager, primarily to better coordinate production, sales, finance and engineering departments. Mr. Rich will continue to be responsible for all production and mining operations. George B. McMeans, general superintendent of the plant at Fontana will be in charge there.

Steel men had something else to

1927. In 1927, this Twin Disc equipped Keystone Model 4 Gas Boom Swing Excavator with skimmer attachment was working on Missouri Highway 16, near Marionville, Mo.

1949. Keystone's modern Model 18-A, still Twin Disc equipped, can be found on many a job like the one being handled by the Spiniello Construction Co., Newark, N. J., shown below.



Keystone Combination

The first Twin Disc Clutch to be used by the Keystone Driller Company, Beaver Falls, Pa., was installed in the days of horses and wagons in a Keystone Model 4 Gas Boom Swing Excavator equipped with a skimmer bucket.

Today, Keystone's current diesel-powered Model 18-A Full Revolving Hoe . . . successor to the Model 4 . . . also uses Twin Disc Clutches for power transmission.

There are many leading manufacturers of heavy-duty machinery, who, like Keystone, have standardized on Twin Disc Clutches and Hydraulic Drives for more than two decades. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

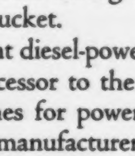
Hydraulic Torque Converter

Heavy Duty Clutch

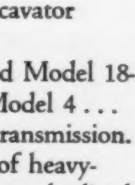
Machine Tool Clutch

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
REG. U.S. PAT. OFF.

Tractor Clutch



Marine Gear



JUDGE TWIN DISC BY THE COMPANIES IT KEEPS

TYPICAL FREIGHT ALLOWANCES IN EFFECT BY KAISER CO., INC.

Consuming Points	Products →	Plates	Shapes Structural	Strip Hot Rolled	Strip Cold Rolled	Sheets Hot Rolled	Bars Carbon	Bars Alloy
	F.O.B. Fontana Prices →	$5.30	$3.80	$4.65	$5.55	$4.15	$4.00	$4.75
	Full Freight From Fontana To Destination per 100 lb ↓		Freight Allowance Per 100 lb (Fontana to Destinations Shown)					
Los Angeles	$ .0824	0	$ .011	0	0	$ .0194	0	0
San Diego, Calif.	.1957	0	0	$ .1508	$ .0910	.1685	0	$ .1220
Bakersfield, Calif.	.2472	0	0	0	.1425	0	0	0
San Jose, Calif.	.3193	0	.2480	.1935	.2146	.2113	$ .1251	.1647
San Francisco	.3193	0	.2480	.2498	.2146	.2675	.1869	.2221
Portland, Oregon	.8784	0	.8071	.8520	.7737	.8695	.7534	.8230
Seattle, Wash.	.9534	0	.8071	.9268	.8487	.9445	.8284	.8980
Spokane, Wash.	1.2692	0	not quoting	not quoting	not quoting	.5953	.4784	.5488

think about last week when scrap prices on the coast again were reduced under the pressure of falling eastern prices and large inventories. Last Friday buyers were willing to pay only $20 for No. 1 heavy melting and $18 for No. 2 heavy melting, although actual purchases were negligible. These same prices will be in effect from Los Angeles to Seattle this week. Although a further break in the market has been anticipated, it was believed it would not come about for at least another week, but it is possible the answer may be found in a declining production rate.

Few Plant Disruptions After Earthquake Strikes

Seattle

• • • **A survey** of the effects of the heaviest earthquake the Pacific Northwest has ever experienced and which caused millions of dollars worth of damage 2 weeks ago, indicates that the metalworking industry got off lightly.

In one of the more spectacular incidents, the 11½-ton saddle which had just been put in place on top of one of the towers for the new Tacoma Narrows Bridge by Bethlehem Pacific Coast Steel Corp. was shaken loose and plunged 500 ft through a working barge and on to the bottom of the channel.

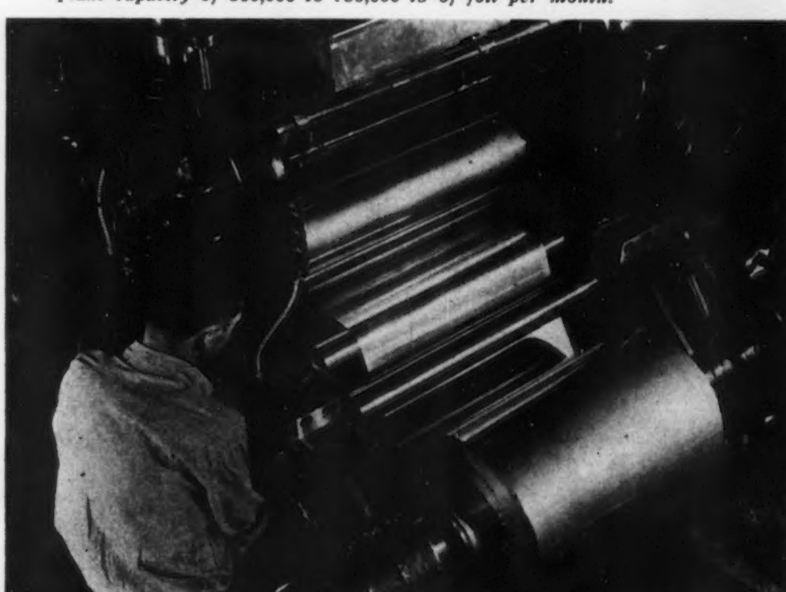
Through the alertness of workmen who attached cables to the sinking barge, the sunken vessel and valuable saddle were quickly recovered.

Pacific Car & Foundry Co. at Renton near here, was temporarily closed down to permit thorough investigation of all equipment. The Boeing Airplane Co. plant sustained broken windows and cracked walls but no damage occurred to the millions of dollars worth of Air Force and commercial planes on the fields and in the factory.

Isaacson Iron Works was closed for 1 day, primarily to permit employees to go home and take stock of whatever damage occurred to their property.

•

ALUMINUM FOIL: *A new source of aluminum foil for converters and manufacturers was recently made available as The Permanente Metals Corp. started production at its plant located near San Jose, Calif. The rolling mill in foreground is one of 16 which will contribute to anticipated plant capacity of 500,000 to 750,000 lb of foil per month.*



Navy to Lay Off 1300

Terminal Island, Calif.

• • • **Because of waning** appropriations, the Navy will lay off 1300 men in the large ship repair yard near Long Beach between now and June 1.

The yard has been used mainly for mothball fleet activities and for fleet repairs with civilians doing almost all of the work. The number of men who will be rehired when new appropriations are forthcoming this summer will depend on the amount of money voted by Congress.

Sixty-three hundred civilian workers will still be on the job when the laying off of the 1300 is completed.

Franks Truck-Mounted Rotary Drilling Rig on Oshkosh Chassis (with dual front wheels and four-wheel drive) uses Vickers Hydraulic Power Steering for easy and SAFE STEERING.

HEAVIER FRONT-WHEEL LOADING WITH VICKERS *Hydraulic* POWER STEERING

With ordinary steering, front-wheel loading is sharply limited by what the driver can pull and by acceptable steering gear ratios. But with Vickers Hydraulic Power Steering, the driver doesn't have to pull . . . hydraulic power does the work. Front-wheel loading can be any amount the chassis can take. No matter how much it is, the steering is effortless and safe. The Vickers Hydraulic Booster puts no load on the steering gear. The steering force reaction is absorbed by the frame . . . so front-wheel loading does not affect the steering gear. Write for Bulletin 47-30a for the many other advantages of Vickers Hydraulic Power Steering. 3822

VICKERS HYDRAULIC POWER STEERING IS ***Effortless, Positive, Shockless.***

Vickers Hydraulic Steering Booster with Integral Overload Relief Valve. Bulletin 47-30a.

Vickers Balanced Vane Type Pump is Engine Driven. Bulletins 36-12 and 49-52.

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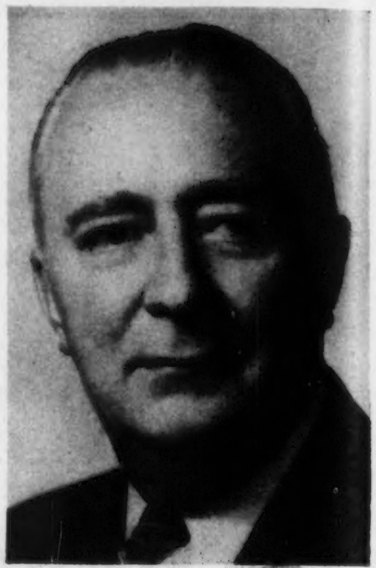
ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

DR. WILLIAM M. LOFTON, JR., director of research and development, Sloss Sheffield Steel & Iron Co.

PERSONALS



WALTER D. SCHLUNDT, New York district sales manager, Pittsburgh Steel Co.

• **William M. Lofton, Jr.** has become associated as director of the division of research and development, Sloss-Sheffield Steel & Iron Co., Birmingham. Dr. Lofton had formerly served as assistant director of the University of Louisville Institute of Industrial Research.

• **E. R. Zabriskie,** vice-president and general sales manager of the Doehler-Jarvis Corp., New York, has been elected a director and appointed a member of the executive committee of that organization. **Howard W. Bartholomew,** manager at the Pottstown, Pa. plant, and **Robert H. Kitzman,** manager of the corporation's two plants in Toledo, have been named vice-presidents.

• **Dr. Paul R. Austin,** an assistant director of the chemical department laboratory at the experimental station of E. I. duPont deNemours & Co., Inc., Wilmington, Del., has been appointed director of the electrochemicals department's technical division. **Dr. Harold J. Barrett,** chemical research manager at the Niagara Falls plant, has been named manager of field research with headquarters in Wilmington. **Dr. Campbell Robertson,** manager of chemical research at the Perth Amboy, N. J. plant, has been appointed chemical research manager at the Niagara Falls plant. These appointments are effective May 1.

• **Philip F. Thayer** has been appointed general manager of Willamette Iron & Steel Corp., Portland, Ore. Mr. Thayer had previously served as vice-president and director of Rheem Mfg. Co., with headquarters in San Francisco. In his new position he succeeds **G. W. Wintz,** who is being transferred to the main office of Guy F. Atkinson Co., parent organization of Willamette Iron & Steel Corp. in South San Francisco. **Donald J. Kooker,** who had formerly been associated with Rheem at Chicago, has been named assistant manager of Willamette. **Dwight Richards,** who has been chief engineer with the industrial division of Buda Mfg. Co., in Chicago, has been named chief engineer at Willamette. **Robert R. Schultz,** who had formerly been sales manager for the industrial division of Nordberg Mfg. Co. in Milwaukee, has been appointed sales manager.

• **F. M. Rich,** vice-president in charge of operations, Kaiser Co., Inc., and formerly located in Fontana, Calif., has been transferred to the Oakland, Calif. home office of the company. George B. McMeans, general superintendent, has been placed in charge at Fontana.

• **Donald Alexander** has resigned as vice-president of the Budd Co., Philadelphia, effective May 11. Mr. Alexander, who has been connected with the company since 1919, is retiring from active business but continues as a member of the board of directors.

• **Wendell Garman** has been named personnel manager for Tinnerman Products, Inc., Cleveland. Mr. Garman had formerly been associated in personnel work with Harris-Seybold Co., Thompson Products, Inc. and Towmotor Corp.

• **C. E. Owen** has been elected chairman of the board of Lone Star Steel Co., Dallas, and **W. O. Irvin** has been elected to fill a vacancy on the board created by the resignation of **R. W. Wortham.**

• **Walter D. Schlundt** has been appointed district sales manager, New York district sales, Pittsburgh Steel Co., Pittsburgh. He became associated with the company in 1929 and has held the position of district sales manager at the company's Detroit and Pittsburgh sales offices.

• **W. C. McConnell** has been appointed special representative to the steel industry by Chas. Taylor Sons Co., Cincinnati. Mr. McConnell has served as plant superintendent at the Massillon Works of Republic Steel Corp. and as assistant works manager at Ridgewood Steel Co. and at Mitchell Steel Co.

• **Ernest E. Graham** of E. E. Graham & Co., Houston, has been appointed sales representative for the Cooper Alloy Foundry Co., Hillside, N. J., servicing Texas, Oklahoma and Louisiana.

• **R. M. Smith** has been elected vice-president of Union Tank Car Co., Chicago. Mr. Smith had formerly served as assistant vice-president.

• **George A. Hays, Jr.** has been named director of market development of Oil Well Supply Co., with his headquarters at Tulsa, Okla. Mr. Hays had been connected with Wilson-Snyder Mfg. Div. and its parent company, Oil Well Supply, for 24 years prior to 1947 when he resigned to become associated with Hinderliter Tool Co. at Tulsa.

ALEX CRUICKSHANK, plant engineer, maintenance, McConway & Torley Corp.

• **Alex Cruickshank** has been appointed plant engineer in charge of maintenance for McConway & Torley Corp., Pittsburgh. Mr. Cruickshank had previously been associated with the New England Metallurgical Corp. and with Jones & Laughlin Steel Corp.

• **J. E. N. Hume** has been elected a director of Sharon Steel Corp., Sharon, Pa. Mr. Hume retired as commercial vice-president of General Electric Co. last year after serving GE 41 years.

• **Chester D. Jones, Jr.,** has been appointed purchasing agent, Diamond Alkali Co., Pittsburgh. Mr. Jones joined Diamond's purchasing department as a buyer in 1938. Since 1946 he has served as plant purchasing agent in Houston during the construction and initial production period of the company's recently completed electrolytic chlorine-caustic soda plant. **W. C. Logan,** who joined the department in 1925, has been appointed assistant purchasing agent. **W. C. Mahan,** associated with the company for 24 years, and in purchasing since 1937, has advanced to assistant purchasing agent. **P. P. Eppinger,** who became associated with Diamond in the purchasing department of its Houston plant two years ago, has been named to succeed Mr. Jones as plant purchasing agent there.

• **Carl G. Malmberg** has been appointed superintendent of the forge shop, Allis-Chalmers Mfg. Co., Milwaukee, succeeding **F. A. Breig,** who has retired. Mr. Malmberg performs these duties in addition to those of superintendent of the tank and plate shop. Mr. Malmberg has been with Allis-Chalmers since 1929. Mr. Breig had been foreman of the forge shop at Dickson Mfg. Co. when that company was taken over in 1901 by Allis-Chalmers. In 1911 he left the employ of that company, returning 25 years later, after serving with Blake & Knowles Steam Pump Co., Penna Forge Co. and Mesta Machine Co.

• **R. E. James** has been named western regional manager of appliance sales and **F. J. Blume,** eastern regional manager of appliance sales, Rheem Mfg. Co., New York. Mr. James has been with Rheem since 1930 and Mr. Blume joined the company as eastern regional sales promotion manager in 1948.

• **John E. Fox,** manager of industrial relations for the Lamp Div., Westinghouse Electric Corp., in Bloomfield, N. J. for the past three years, has been appointed staff assistant to the vice-president in charge of the division. Mr. Fox has been with the company since 1931. **Edward L. Ogden** has been appointed supervisor of industrial relations in Bloomfield and Belleville, a newly-created position. Mr. Ogden joined the company in 1942.

• **Louis N. Montana** has been appointed consultant in tin mill products applications by Dumas Steel Corp., Pittsburgh, an affiliate of M. G. Dumas & Sons.

• **William C. Griffin** has become associated as business manager and purchasing agent with L. S. Watlington Mfg. Co., Bloomington, Ill. He had formerly served with Eureka Williams Corp. as raw materials buyer.

• **Richard L. Donoghue** has been appointed director of purchases for the Easy Washing Machine Corp., Syracuse, succeeding **F. O. Dutton,** who has resigned. Mr. Donoghue joined the purchasing staff of the Easy Corp. in 1947.

BERTON M. SHARPE, sales engineer, Standard Furnace Div., Surface Combustion Corp.

• **Berton M. Sharpe** has been appointed sales engineer covering the territory of southern Indiana, southwestern Ohio and northern Kentucky of the Standard Furnace Div., Surface Combustion Corp., Toledo. He has been with Surface Combustion since 1937.

• **Max M. Monroe** has been appointed general manager of the aeroproducts division of General Motors at Dayton. He has been serving as acting general manager since the death of **W. J. Blanchard** late last year. Mr. Monroe has been with GM since 1923 when he joined the Inland Mfg. Div. as comptroller.

• **D. D. Robertson** has been appointed sales manager and **W. L. Stone,** assistant sales manager of Spicer Mfg. Div. of Dana Corp., Toledo. Mr. Robertson joined the company as sales engineer in 1937 and has served as assistant sales manager since 1943. **Mr. Stone** had formerly served with Brown-Lipe Gear Co. of Syracuse and came to Toledo when that company merged with Spicer Manufacturing.

• **Robert C. Wilson** has been appointed manager of sales at the Norwood, Ohio works of the Trumbull Electric Mfg. Co., Plainville, Conn. Mr. Wilson had formerly served with General Electric Co. He joined the sales division of Trumbull in 1948.

• **Edwin S. Carman,** founder and president for 20 years of Edwin S. Carman, Inc., Cleveland, has been elected chairman of the board of directors. **Thornton S. Carman,** who has also served the company for 20 years, and as general manager for the past 5 years, has been elected president.

• **Earle O. Hultquist** has been elected a director and president of the Jamestown Metal Corp., Jamestown, N. Y. **J. H. Stohlbrost** has been named a director, vice-president and general manager; **Carl A. Hultquist,** a director and vice-president; **Marie S. Peterson,** treasurer; **Carroll M. Hall,** secretary and **Myrtle L. Saunders,** assistant secretary. **Fritts L. Magnuson** has been elected a director.

• **Louis S. Morse, Jr.** has been made president and general manager of Detroit Plating Industries, Detroit.

• **Donald Williams** has been named director of sales, Dow Chemical Co., Midland, Mich., succeeding Leland I. Doan, who became president of the company. **Donald K. Ballman,** formerly assistant general sales manager, has been made general sales manager, succeeding Mr. Williams in that position. **L. S. Roehm** has been named assistant general sales manager.

• **Anton F. Waltz** has resigned as president of Advance Pressure Castings, Inc., Brooklyn. **Alfred Schneier** has been elected to succeed Mr. Waltz as president, the latter continuing in a consulting capacity and as a director.

• **Edward L. McIlhenny** has been named manager of the southern division of the Ferro Enamel Corp. in Nashville, Tenn. Mr. McIlhenny joined the company in 1945.

• **L. C. Newton** has been appointed sales representative by Titan Mfg. Co., Bellefonte, Pa., with headquarters in St. Paul, Minn. Mr. Newton formerly served as vice-president of Standard Salt & Cement Co., Stillwater, Minn.

• **A. Eisenberg** has severed his connection with Steel Rolling Co. Inc., and Steel Processing Corp., Brooklyn.

JAMES M. STAPLETON, division superintendent of blast furnaces, South Works, Carnegie-Illinois Steel Corp.

• **James M. Stapleton** has been appointed division superintendent of blast furnaces for the South Chicago plant of Carnegie-Illinois Steel Corp., succeeding **George E. Steudel,** who has retired. **W. D. Millar** has been named to succeed Mr. Stapleton as assistant blast furnaces division superintendent. Mr. Stapleton started with the organization as a gas pressure operator in 1918 and was transferred to the Geneva, Utah plant during World War II to superintend blast furnaces. He returned to the South Works in 1944. Mr. Millar started at the South Works in 1936 as blast furnace apprentice.

• **Wallace W. Smith,** formerly general superintendent of the Pittsburgh plant of Pittsburgh Screw & Bolt Corp., Pittsburgh, has been appointed manager of operations of the Pittsburgh and Graham plants. **Russell T. Pollock,** formerly assistant superintendent of the Pittsburgh plant, has been appointed general superintendent there. **F. B. Gordon,** formerly vice-president in charge of operations, and **G. H. Lee** continue as vice-presidents of the corporation in advisory positions.

• **Glenn E. Martin** has been appointed advertising manager of the replacement tire sales division of the B. F. Goodrich Co., Akron, Ohio. Mr. Martin has been with the company since 1933.

• **Samuel A. Smith** has been named vice-president in charge of research and development, General Cable Corp., New York. **Oscar G. Garner** has been elected vice-president in charge of manufacturing and **Allen D. Pettee,** vice-president in charge of product engineering.

• **J. B. Carey,** formerly sales manager, has been appointed vice-president in charge of research and chemical manufacture, A. F. Holden Co., New Haven. **C. R. Brown,** who has been associated with the company for the past 12 years in various sales capacities, has also been appointed vice-president. **C. R. Hecker,** who has been connected with the metalworking industry for many years, has been appointed sales manager and export manager.

• **Richard B. Leng** has been appointed controller of the electronics division of Sylvania Electric Products Inc., Boston. Mr. Leng joined the staff of the director of manufacturing in 1946 and the following year became manager of production planning and purchasing at the electronics plant in Boston.

• **Dr. Raymond E. Masters** has been appointed medical director for the recently-formed atomic power division of Westinghouse Electric Corp., located at the division's new Bettis Field plant on the outskirts of Pittsburgh. Dr. Masters has been with the Westinghouse medical department since 1940 and with the East Pittsburgh medical staff since 1948.

• **R. P. Colosi** has been appointed office manager of the Cleveland district sales office, the Carborundum Co., succeeding H. P. Erbe, who has been made office manager at Pittsburgh. Mr. Colosi had previously been office manager of the Buffalo district sales office. **H. E. Morrill,** supervisor, branch inventories, has been promoted to the position of office manager of the Chicago district sales office succeeding **R. J. Nemec,** who has been appointed office manager of the St. Louis district sales office succeeding **A. L. Fischer.** Mr. Fischer has been assigned to important duties with the St. Louis office organization.

• **Harry D. Garber, Charles B. Debnar** and **Lawrence C. Jones** have been appointed vice-presidents of the Van Dorn Iron Works Co., Cleveland.

• **Ellsworth B. Beyer,** formerly purchasing agent, Elizabeth Iron Works, Inc., Union, N. J., has been promoted to sales and estimating. Mr. Beyer joined the company in 1945. **Edward J. Manz** has been appointed purchasing agent succeeding Mr. Beyer in that position.

• **W. A. Terwilliger** has been appointed manager of the pigment division of the Atlantic branch of National Lead Co., New York, succeeding **William F. Hurley,** who has retired. **J. A. Zang** has been named assistant manager of the Atlantic branch pigment division. Mr. Terwilliger joined National Lead in 1919, and since 1942 has served as sales manager of the linseed oil department of the branch. Mr. Zang joined the company in 1905, and since 1939 has served as sales manager of the white lead division of the Atlantic branch. Mr. Hurley joined the company in 1911 as junior accountant with Matheson Lead Co.

• **E. W. Pat Smith** has been appointed special assistant to the general sales manager of Owens-Corning Fiberglas Corp., New York. Until recently Mr. Smith served as vice-president for sales of Philip Carey Mfg. Co.

• **W. C. Osha** has been appointed plant superintendent of the Dover, N. J. fabricating plant of L. O. Koven & Brother, Inc., Jersey City. Before joining L. O. Koven, Mr. Osha served as assistant general supervisor of welding for Pullman Standard Car Mfg. Co., and for many years previously was general supervisor of welding for the American Car & Foundry Co.

• **Edward H. York, Jr.** has been elected to the board of directors of the Alan Wood Steel Co., Conshohocken, Pa.

• **Everett Gilbert** has been promoted to vice-president for engineering, Radio Frequency Laboratories, Inc., Boonton, N. J. Mr. Gilbert has served as special projects engineer for the company since 1945.

WILLIAM F. GODEJOHN, vice-president, Harbison-Walker Refractories Co.

• **William F. Godejohn** has been elected vice-president in charge of operations and a director of Harbison-Walker Refractories Co., Pittsburgh. Mr. Godejohn has served as assistant to the president since late last year. He had formerly been district superintendent for Harbison-Walker in charge of the Vandalia and Fulton works.

• **E. A. Bertram** has been appointed manager of sales for the Brown Fintube Co., Elyria, Ohio.

• **Sidney E. Horton, L. McGregor Demarest** and **Spencer Montgomery** have been elected directors of E. Horton & Son, Windsor Locks, Conn. Mr. Horton, a grandson of the founder of the company, is New England manager for Bardons & Oliver; Mr. Demarest is owner of S. M. Demarest & Associates, industrial engineers and consultants of New York, and Mr. Montgomery is president of Montgomery Co. of Windsor Locks.

• **Dr. Robert L. Johnson,** president of Temple University, Philadelphia, has been elected to the board of directors of Avco Mfg. Co., New York.

• **Alfred S. Osbourne** and **Louis A. Mertz** have been elected directors of Dravo-Doyle Co., a subsidiary of Dravo Corp., Pittsburgh.

• **T. P. Stone** and **M. J. Cook** have joined the Wolverine Tube Div., Calumet & Hecla Consolidated Copper Co., Detroit, as salesmen. Mr. Stone, who formerly served as a sales representative for the Linde Air Products Co., has temporarily set up headquarters in Atlantic Beach, Fla. Mr. Cook, who was recently connected with Orgill Bros., Memphis, will shortly establish headquarters in Atlanta.

OBITUARY...

• **Frank E. Vigor,** 62, vice-president in charge of plants and mines, Armco Steel Corp., Middletown, Ohio, died April 13. Mr. Vigor joined American Rolling Mills Co., predecessor of Armco Steel Corp., in 1910, and had been a vice-president of the latter since 1943.

• **George M. Bird,** 63, manager of the wire section products division, U. S. Steel Export Co., New York, died April 18.

• **Clarence F. Wackman,** 58, assistant secretary and works manager, Southline Metal Products Co., Houston, died April 11.

• **William von Phul,** 77, retired president, Ford, Bacon & Davis, New York, died April 17.

• **Martin Rintz,** 66, foundry superintendent, Chicago Works, Continental Foundry & Machine Co., Chicago, died April 7.

• **E. Warner Bacon,** 57, president, Erie Tool Works, Erie, Pa., died April 8.

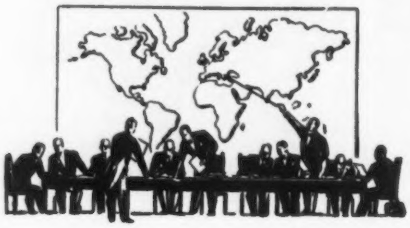
• **Edward B. Butterfield,** superintendent, Rochester Casting Corp., Rochester, N. Y., died recently.

• **William H. Roth,** 74, retired president, Simplex Valve & Meter Co., Philadelphia, died April 12.

• **Col. Harry H. Stout,** 76, retired chief metallurgist, Phelps Dodge Corp., New York, died April 13.

European Letter

• Britain and United States should be concerned with Communists' efforts to realign China internationally against Western democracies . . . Moral support and monetary aid should be extended now to existing Chinese government.



LONDON — The recently established tradition of bipartisan foreign policy in the United States is certainly not operative with regard to the affairs of China, and the last few days have seen the outbreak of a political storm over American aid to non-Communist China which may prove more than a passing phase in American party politics. Following Mr. Churchill's speech at Boston on March 3 in which he described the collapse of China under Communist attack and intrigue as the worst disaster since the Allied victory over Germany and Japan, Mr. Harold Stassen called for American support for a non-Communist regime in South China. Since then it has been stated that the Republican Policy Committee is endorsing the demand for a special Congressional investigation of the Government's China policy, and there have been threats of obstruction of appropriations for arms for Europe under the North Atlantic Pact unless the demand is granted. On April 14 Congress decided to release $54 million of unexpended China aid funds for use at President Truman's discretion in non-Communist China. On the other hand, the Secretary of State, Mr. Acheson, strongly opposed a bill introduced by Senator McCarran for granting China a further $1,500 million of military and economic aid, declaring that such aid was almost certain to be a catastrophe.

There are in fact two distinct issues in current American controversy about aid to China. One is the question of the rightness and expediency of intervention against Communism in China, assuming that funds for aid are freely available. The other is the question of priorities as between Europe and China for the expenditure of the not unlimited resources which the United States can spare for its foreign commitments. It might be very desirable to assist anti-Communist forces in China, and yet be inexpedient to do so at the expense of aid sufficient to sustain the economic and military reinforcement of Europe. The prevailing policy of the Truman Administration is apparently to give priority to Europe, just as during the war President Roosevelt refused to allow the clamor of the Pacific Firsters to divert him from the strategy of concentration against Germany rather than Japan.

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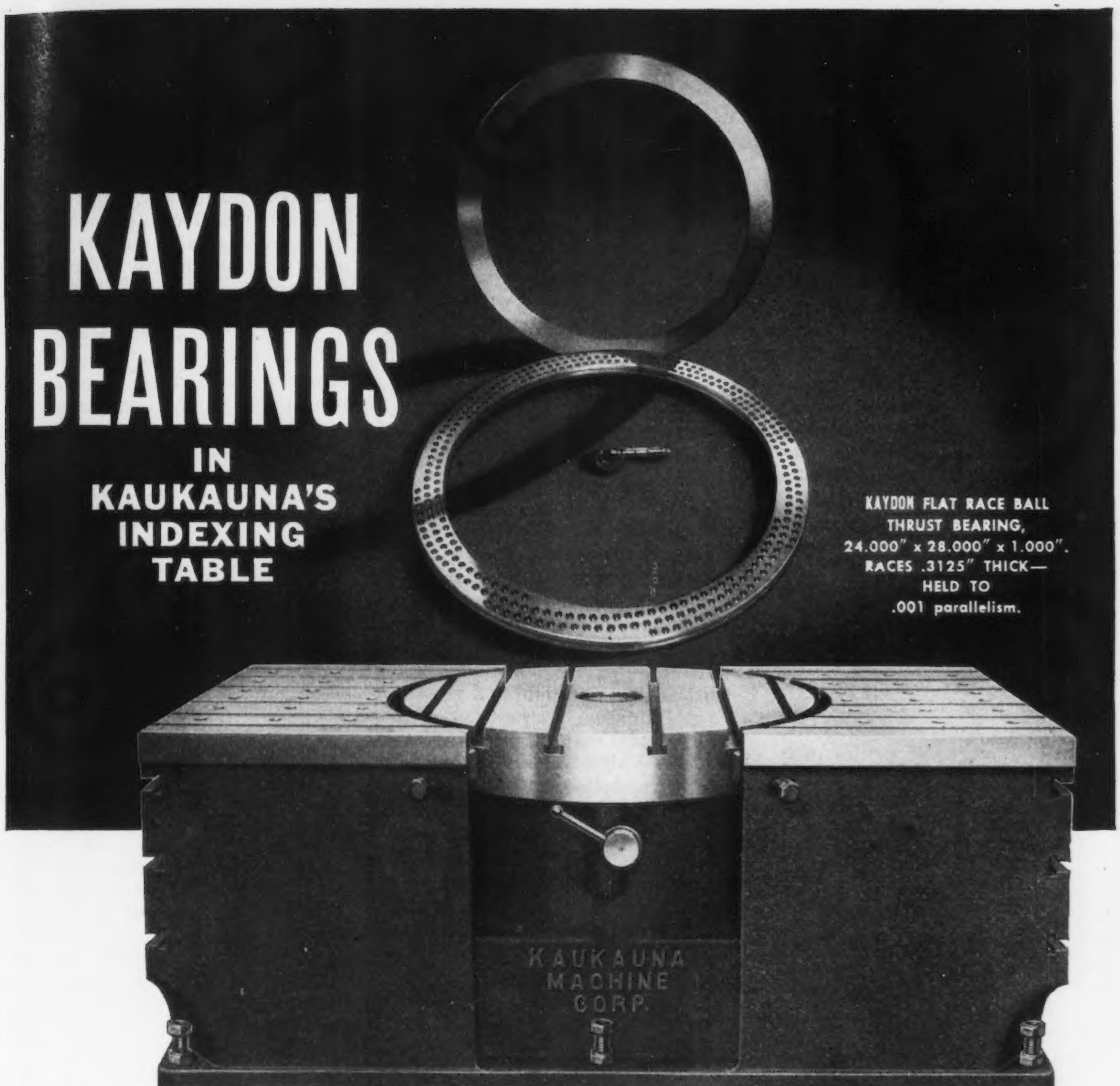
BUT there are strong roots in American tradition for the sentiment which puts the Far East before Europe as an American concern; and it is natural, even apart from political conviction, for the Republicans to exploit so promising a field for discontent with President Truman's policy. For, whatever is now said, the policy has been a failure, and the Administration cannot escape criticism. If it is true that the Chinese government is not worth helping, then why have so many million dollars of American money been spent on what was at best a foolish backing of the wrong horse? If, on the other hand, support for the Chinese government was the right policy for the United States to pursue, is it wise or dignified to abandon it when only one half of China has fallen to the Communists and resistance to them is by no means at an end? If the Administration now abandons China, it condemns its own previous policy; if it claims to have been right previously, it will find difficulty in justifying a panic-stricken retreat from positions not yet proved untenable.

Mr. Acheson has stated that he does not believe that further supplies to the Chinese government would alter the pattern of current developments in China. What then is the pattern? Since the heavy defeats of the Government forces last year in Manchuria and North China, there has been a general belief in the west that nothing can stop the Communist conquest of the whole of China, though conditions in South China are in certain respects quite different from those prevailing in the north. It is also held, and on good evidence, that the vast majority of the Chinese people are sick of war and would welcome peace at any price; but it is not clear why this feeling should now weigh more strongly against the Government, if it refuses to submit to terms equivalent to unconditional surrender, than against the Communists, if they insist on continuing the war for the subjugation of the south. So far, in fact, there has been no definite military decision of the civil war that can be regarded as valid for the whole country; there is no merely strategic reason for the Government armies in the south to surrender without further military operations. The Communists have so far won on points, but there has been no knockout blow.

KAYDON BEARINGS

IN KAUKAUNA'S INDEXING TABLE



As builders of precision metalworking machines, Kaukauna Machine Corporation, Kaukauna, Wisconsin, engineered this 2¼ ton Indexing Table to support heavy work pieces, without deflection, for machine tools, and for inspection and layout work.

The center of the main bed of this table is a 36" diameter indexing platen. Support of this platen demands an extremely large, rugged, precision bearing of big capacity.

Kaukauna engineers found **KAYDON** Bearings met their requirements, just as many other designers of heavy-duty machinery have found **KAYDON** Bearings improve ponderous oil field equipment, huge grinders, steel mill and paper mill machines, road-building units, excavators, hoists, bending machines and other heavy duty machines.

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THE Communists, however, in the peace talks at Peiping have taken the line that nothing remains but to arrange the details of the present Government's surrender, the reorganization of its armies under Communist command, and its replacement by a coalition government, in which the Communists would have the right to select ministers to represent the Kuomintang, and the only minor parties to be represented would be those already in league with the Communists. The question of the composition of the government is really subordinate to that of control of the armies, for a genuine coalition between the Communists and their opponents can only be maintained as long as there is a balance of mutually independent armed forces backing each side; in other words, only if the central government is not a unitary government, but a confederation of two autonomous regional blocs. Otherwise, the Communists will, after using the show of coalition to obtain international and especially American diplomatic recognition, purge the non-Communist elements by stages until the coalition is transformed into pure Communist rule.

If President Li Tsung-jen and his generals choose to capitulate and accept terms which mean their elimination by the standard Communist technique, that is their affair, and nobody can help people who do not fight for their own survival. But if the Chinese government decides that the terms are unacceptable and moves to Canton to continue resistance, with that city as its new capital, what is to be done? Is it to be denounced for destroying the hope of peace in China, or is it to receive at any rate a moderate amount of American aid to give it a chance of holding its own as a regional unit? The Kwangsi troops under President Li Tsung-jen himself and General Pai Chung-hsi, and the Kwangtung forces under Generals Chang Fa-kwei and Yu Han-mou, should be capable of formidable resistance in defense of their own provinces, even if the Nanking-Shanghai area falls to the Communists. If their resistance should nevertheless in the end collapse, the situation could not be worse from an American point of view than that which would be created by capitulation in advance and formation of a pseudo-coalition government doomed to perpetual glissade from purge to purge.

THE American and British concern with China's civil war does not relate to Chinese internal affairs, but to the effort of the Communists to realign China internationally in open hostility to the western democracies. Mao Tse-tung went out of his way in his statement on the Atlantic Pact to express his uncompromising antagonism to everything for which the western democracies stand. In view of this attitude which is, after all, the only one which a convinced Marxist-Leninist can honestly adopt, it is plainly in the interest of Britain and the United States to give at least moral support to the existing Chinese government as long as it remains on Chinese soil and resists Communist conquest. Even if only a small part of Chinese territory could be held, it would keep the political situation fluid and prevent the consolidation of a hostile regime as a national entity, while the condition of China would be no worse than it was between 1917 and 1928, when there were rival governments in north and south, but the Chinese state was never formally divided.

British and American diplomacy, however, appears to be deeply infected with the idea that the Chinese Communists are irresistible, and that there is nothing to be done about it except to submit to the pattern of current developments. It is indeed at first sight logical to infer that, if the government could not win against the Communists when it possessed nearly all the strategic key points of the country, it cannot hope to hold its own if it is driven into a corner of its national territory. But the Communists have so far had their successes in regions where the Kuomintang (which has never grown out of being a party of southerners) never took firm root, where the Japanese occupations, (lasting 14 years in Manchuria and 8 years in North China), had wiped out all poiltical life except for Communists guerillas and pro-Japanese collaborators, and where the Communist forces were strategically placed at the outset astride the principal lines of communication. It does not follow at all that the same story will be repeated in the south.

MOREOVER, it is relevant, in considering the prospects of resistance to Communism, to point out that the most reactionary element of the Kuomintang, the notorious "CC clique," has now been removed from power, and that the political appeal of Communism is liable to be greatly reduced by any signs of alternative progressive leadership. If American diplomacy were to be devoted to the encouragement of social reforms instead of to pressure on the Chinese government to accept Communist terms, and if military assistance were to take the form of supervision of commissariat, designed to make sure that soldiers get their rations, instead of tardy supplies of largely unsuitable armaments, the chances of successfully opposing Communism in at any rate a part of China would not be so poor as is generally believed.

On thing is clear in the current crisis of the Chinese conflict: the political fortunes of President Truman and Mr. Acheson are now very much at stake in the conduct of American policy towards China. Their political opponents in the United States see an opportunity of doing them great damage. Mr. Acheson will certainly be on strong ground in refusing to jeopardize aid to Europe by large expenditures with higher risks on less essential objectives in Asia. America's strongest allies are in Europe, and it is there that money and organization have produced, and will go on producing the firmest check to Soviet ambitions. But a little aid to China could be made to go a long way; it only needs to be intelligently applied and inspired by a consistent policy and even if it fails to achieve its purpose it cannot make the Communists more hostile to America than they already are.

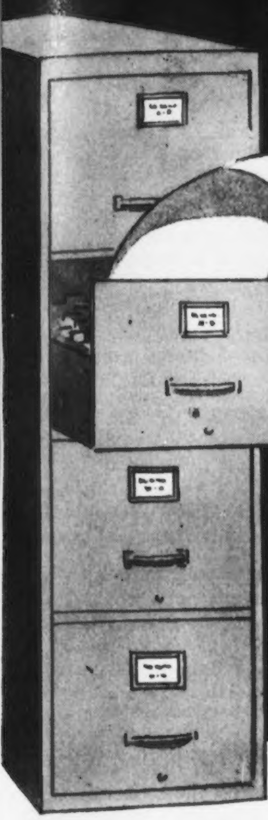
Woodward Iron Profit Up

Birmingham

• • • **Net profit** of Woodward Iron Co. for the first quarter of 1949 exceeded that for the corresponding period of 1948 by more than $616,000.

The 1949 figure after provision for taxes on income was $1,678,310.74, compared to $1,061,538.02 for the first quarter of last year. The 1949 first quarter net income was equivalent to $2.38 per share on stock outstanding.

"RELIANCE OK"..P.A.



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Quotation Reproduced From A Letter in Our Files

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OUR CUSTOMERS' MAN

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• **FAST WORKERS**—Two 17-gross ton electrically operated Hulett iron ore unloaders costing an estimated $2 million are to be installed at the Huron, O. ore dock of the Wheeling & Lake Erie Railway. Contract for their installation has been awarded Wellman Engineering Co., which expects to have the unloaders in operation by the middle of 1950.

• **EASTERN PIG IRON**—The foundry iron market in the East is very quiet as foundries work off their high priced foreign and domestic iron inventories at 2 and 3-day per week operations. One furnace requested several big consumers to set their own price. Silvery iron is being offered in the Philadelphia market by producers who have been inactive there since the war.

• **KNOCKOUT**—The Supreme Court this week held that basing points are illegal. In a 4 to 4 decision (Justice Jackson not voting) the high court affirmed the opinion of a court of appeals holding the use of basing points in the Rigid Steel Conduit industry to be a violation of the Federal Trade Commission Act. (See p. 121.)

• **DENIAL**—Reports that Youngstown Sheet & Tube Co. was negotiating for the purchase of the branch of the Baltimore & Ohio Railroad from Fairport Harbor, Ohio to Youngstown, were denied at press time by a spokesman for Youngstown Sheet & Tube Co. and a spokesman for the B. and O. It had been rumored that Youngstown Sheet & Tube Co. planned to buy the branch and install a conveyor belt for the transportation of iron ore to Youngstown.

• **SLASHES WASHERS**—Thor Corp. has announced a 13 pct slash in the retail price of its automatic clothes and dishwashers, effective Apr. 25. Cuts were attributed to improved production techniques and greater labor productivity.

• **GALVANIZED CUT**—Reductions in galvanized sheet extras averaging $1.50 per ton were automatically put into effect by Carnegie-Illinois and other sheet producers last week following the zinc price cut. Galvanized pipe makers also adjusted discounts to lower prices by $2 a ton.

• **CAST IRON PIPE**—The United States Pipe & Foundry Co. has reduced the general selling prices of its cast iron pipe and fittings $7 a net ton on all shipments made to its customers on and after Apr. 25.

• **LAKE TRAFFIC**—Record tonnages of iron ore, coal, limestone and petroleum were hauled on the Great Lakes in 1948, according to John T. Hutchinson, president, Lake Carriers' Assn. His report showed: 82,937,192 gross tons of iron ore, highest peacetime tonnage in history; 59,241,228 net tons of bituminous coal, an all time record; 22,282,425 net tons of limestone, also an all time record; 10,955,745 net tons of petroleum products.

• **REDUCTIONS**—International Harvester has announced price reductions on two models of home freezers. The price of the company's 11 cu ft freezer was reduced $28.00 and the 15 cu ft box $25.00. This price adjustment followed the reduction made recently on the company's general line of household refrigerators which became effective Mar. 18.

• **JOBLESS RATE SLOWING**—For the third straight month, unemployment continued to rise but at a slower rate. The increase of 150,000 jobless during March brought the estimated total to 3.2 million, according to the Census Bureau. While the downward drift was mainly in manufacturing lines, iron and steel employment remained stable.

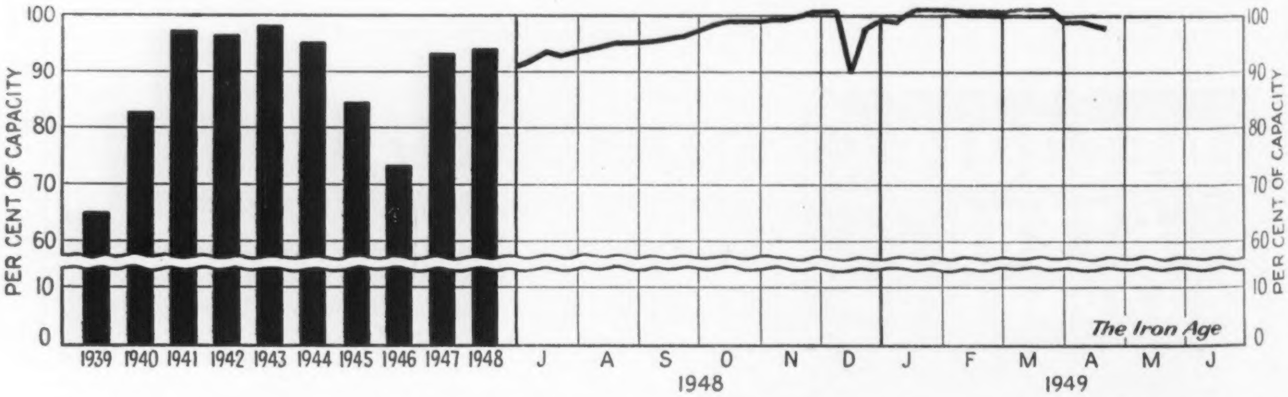
• **WEEKLY PAY DOWN**—Average weekly factory earnings decreased $1 to $53.37 in March, according to the Bureau of Labor Statistics, largely because of shorter workweeks. March workers in iron and steel averaged $59.74 (down 77 cents) weekly and $1.538 hourly (no change).

• **SCRAP EXPORT**—A scrap producer in the East is attempting to obtain an export license for 50,000 tons, for which there is an inquiry. Failure to work out a scrap stockpiling program leaves no other alternative but export to heavy scrap producers.

• **SLAB MILL REPAIR**—Granite City Steel's slab mill will be down for about 3 weeks in June, company officials told THE IRON AGE. They plan to install new runout tables on the slab mill during this period. They expect to accumulate a large enough inventory of slabs prior to June to keep the continuous hot mill in operation.

• **COKE PRICES LOWER**—A reduction of 60¢ per net ton was made last week in prices of foundry coke at Philadelphia.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
April 19........	100.0*	101.0	94.5	98.0	107.0*	104.0*	102.0	94.0	104.0*	100.5	103.0	84.5	85.0	99.0
April 26........	100.5	99.5	94.5	98.0	102.0	104.0	105.0	94.0	100.5	96.0	103.0	80.0	85.0	98.0

* Revised.

Industrial News Summary

- ***High Court Ruling Serious***
- ***Effect On Steel To Be Bad***
- ***Scrap Prices Stop Falling***

UNNECESSARILY high freight costs to steel users in a period of heavy demand, or drastically curtailed steel output in some steel centers when demand falls off, are certainties unless the freight absorption dilemma is settled quickly. The Supreme Court decision this week upholding a lower court's approval of the Federal Trade Commission's ban on the basing point system — even if carried on in absence of alleged collusion — makes some kind of relief action an industrial must.

Efforts to belittle the High Court's decision because it was a 4-4 tie are beside the point. So too is the phantom consolation that the court was ruling on a basing point system and not on freight absorption. The lower court in the Rigid Conduit Case was well aware of the formulas used in arriving at a delivered price — and freight absorption was involved in the case. The decision is doubly serious because the case went to the Supreme Court on that part of the lower court's ruling involving, not collusion, but action by an individual company.

It seems clear this week that absorption of freight by a steel company (or any other firm) by a systematic method could subject that firm (or firms) to FTC action. The only remedies that could eliminate this chaotic condition from American industry are (1) clear cut action by Congress legalizing freight absorption, (2) a rehearing of the case by the Supreme Court and (3) a drastic change in the thinking of some federal trade commissioners on freight absorption methods of selling.

It is doubtful if Congress could agree on a law that would clearly allow freight absorption in meeting competition without long, confusing and maybe futile, exhaustive hearings. It is only a chance that the High Tribunal will soon consent to a rehearing on the Rigid Conduit Case which was to have been THE ONE to clarify the freight absorption issue. As to some Federal Trade Commissioners changing their attitude on the freight absorption problem—that is a possibility and may come true but probably not without strong, frank and open-handed needling from business itself. Then the FTC might define its attitude on freight absorption in clear, simple and forceful language.

UNTIL some constructive action is taken by Congress, the Supreme Court or by the FTC no large steel firm will deviate from an f.o.b. mill pricing system—even if it means cutting output. The decision this week has been a severe blow to the steel industry. Its effect will be far more serious than appears on the surface.

Steel firms and others who want to absorb freight in order to meet competition will think more than twice before they lay themselves open to possible FTC action or to action by consumers who might charge violation of the antitrust laws —which, if proved, mean triple damage. The upheld Rigid Conduit ruling would appear to extend far beyond the mere selling of steel. It may be found that the Supreme Court ruling applies to almost any product sold by a zoning or basing point system where delivered prices are the same—at least that was the opinion this week of some lawyers versed in federal laws.

With steel demand starting to slide off in some areas mills there have had to go far afield to sell some of their steel. Where steel is tight consumers have been willing to pay freight from distant mills. Now it is not necessary for some steel users to go out of their backyard. The steel firm which cannot sell all of its products in distant markets and, at home, has not enough orders to keep its furnaces going at full tilt, will have to cut back operations. That is the outlook for some big steel firms in the near future. Smaller plants are facing this situation now. The ingot rate this week is down 1 point to 98 pct.

THE long and steep drop in scrap prices ended, temporarily at least—this week. THE IRON AGE steel scrap composite advanced 17 cents a gross ton. Increases were not widespread, however. Heavy melting steel at Chicago advanced an average of \$1.50 a gross ton but declined \$1.00 a ton at Pittsburgh. There was a note of hesitancy on the downside but no sharp upward trend was expected.

Steel users who expect that U. S. Steel's revision in its extra charges means an across-the-board steel price cut are going to be disappointed. Some will get their steel for less, others will certainly pay more.

The move has no connection with f.o.b. mill selling, as some have assumed, nor is it the opening gun in the steel price war so many buyers would like to see start soon. Neither is it designed to increase average steel prices.

It is simply a (belated) recognition of the technological changes through which the steel industry has passed. Extras, instead of being based on shibboleths, on operating experience with old-fashioned mills, or on by guess and by gad, will now be based on actual costs.

U. S. Steel Corp. Making Drastic Revisions in Extra Charges

Base Prices Not Involved In Decision to Make Extras Reflect Real Costs

By GEORGE F. SULLIVAN
Pittsburgh Regional Editor

Pittsburgh

• • • **U. S. Steel Corp.** subsidiaries are drastically revising extra charges. In announcing the coming changes in extras and deductions, U. S. Steel president Benjamin F. Fairless said that the revisions are expected to increase some extras and lower others. Base prices are not involved.

The changes will not mean an across-the-board price cut nor are they designed to effect a general increase in steel prices. Instead they will reflect an honest effort to arrive at the "theoretically perfect" extra charge—one based on the actual cost of rolling a given size, doing a specific job or supplying a special analysis.

This type of extra revision has been in the talking stage since U. S. Steel cost analysis discovered that many of their extras bore little or no relation to costs. They began making these discoveries just about the time OPA froze prices. After the war costs were fluctuating too fast for intelligent action.

Some of the new extras were tentatively worked out last fall. Although they could have been announced then and priced so as to make little or no change in the average price of steel, including extras, it is believed that they were held up at that time for fear they would be interpreted as net increases. Any price increase by U. S. Steel at that time—or the mere unsupported assumption that a price increase had been made—would have placed the corporation in an embarrassing political position, its officers felt. Therefore orders went out to make no price changes at all at that time.

Why **make them** now? Because: (1) In this deflationary period there is little chance of U. S. Steel being accused of contributing to inflation; (2) as long as the changes are considered realistic by the corporation it has good reason to make them as soon as practicable; and (3) there is a basic market policy involved.

By establishing what it believes to be a strong and realistic set of extras U. S. Steel sets up a price structure based on the actual cost for each extra charge. Its officers have long felt that extras should stand on their own once they are properly established and that thereafter price changes should be made in the base price only, unless further technological changes alter costs.

In the past when business was hard to get many steelmakers booked orders by lowering or omitting extra charges. U. S. Steel sales officials may now hope that a realistic set of extras will discourage this practice. Its disadvantage is obvious: when you cut base prices to get business you can keep track of costs but when you tinker with extras you drop a wrench into the cost machinery and it may be years before the wreckage is apparent and can be cleaned up.

U. S. Steel did not raise extras on hot-rolled sheets and strip last fall when other major producers (Inland excepted) did. These two items accounted for more than 15 pct of 1948 finished steel shipments.

TESTING!!

A trend toward reduction of extras on hot-rolled sheets and strip to current U. S. Steel levels had already begun before the U. S. Steel revisions were announced.

What are the changes and how long will it take to announce them? This question cannot be answered yet for all products. The U. S. Steel Corp. announcement on Apr. 21 was a surprise. This is shown by the fact that its subsidiaries did not have their revised extras ready. It is understood that some 20 products are involved and that it may be a month or so before all the adjustments are announced. However, sheet revisions were expected this week.

The current extras on sheets are being practically reversed. Extras on narrow widths and short lengths are generally increased while coils and larger widths are reduced. This goes back to the technological revolution in steelmaking, to the supplanting of hand mills by continuous mills. It cost the hand mill more to process a wide sheet than a narrow one—there was more labor involved and the huskier crews on the wide sheets were paid more than the older men on the narrow mills. Generally speaking, (though the proportion is not arithmetical because of higher losses in case of rejects) the continuous mill incurs less labor and overhead per ton on wide sheets than it does on narrower widths.

Other steel producers will undoubtedly meet the new prices. Where U. S. Steel prices are lower, its competitors will have to meet them to book business. And to get a comparable return on shipments they will have to raise extras where U. S. Steel raises them. Besides, many of them will be glad to see a more realistic setup on extra charges.

Sets Production Record

Niles, Ohio

• • • **Niles Rolling Mill** Co. reached the highest monthly steel production and shipment in its history during March, according to President James A. Roemer. Mr. Roemer said the mill now is operating on a full schedule of 16 turns weekly and "there has been no slack in operations nor is any expected in the near future."

The company produced 12,850 tons of steel during March and shipped 14,100 tons. The first quarter of 1949, he said, was "the greatest yet experienced by the firm," quarterly production being 35,571 tons and shipment being 35,834 tons.

Production and shipments in 1948 were the greatest in the company's history, net tonnage being 129,589 and shipment being 128,478 tons.

During 1947, the company's previous record year, production was 118,706 tons and shipment was 117,228 tons, Mr. Roemer said.

CAREFUL: *An extraordinary safety record was established at the South works of Carnegie-Illinois Steel Co. when the maintenance division, with more than 2400 men on its payroll, passed the 2 million man-hr mark without a disabling injury. E. H. Gott, new assistant general superintendent of South works, congratulates R. C. Curphey, one of the men employed in the maintenance department.*

First Quarter New Construction Above That of Last Year

Washington

• • • **American contractors started work on 62,000 new dwelling units during March to bring the 1949 first quarter total to 158,000 starts for the year. Total construction volume for March is estimated at $1.2 billion, bringing the quarter total to $3.5 billion.**

While the number of housing starts for the first quarter was 22,000 less than last year's 180,000, it was 20,000 more than for the same period 1947. Starts for publicly financed housing totaled 9500 for the quarter, as compared with 2300 in 1948.

Lagging housing starts during the quarter apparently does not indicate any slump in home building. Reports to the Bureau of Labor Statistics shows more building permits issued during the quarter than for last year.

No slump in building employment was reported by the BLS for the quarter, the March figure being set at 1,825,000. A slight gain of 20,000 over February was attributed to increased work in the public utilities, highway, and public institution fields.

At the same time, overall new construction put in place during March was estimated at $1.2 billion, a 10 pct jump above February to bring the quarter total to $3.5 billion. Construction during last year's first quarter was $3.2 billion.

Industrial construction, starting a downward trend several months ago, dropped to $96 million in March to pull the quarter average down to $103 million or 20 pct below last year's comparable rate.

Named MacArthur Adviser

Cleveland

• • • **Calvin M. Verity,** former executive vice-president and general manager, Armco Steel Co., has been appointed industrial adviser to Gen. Douglas MacArthur, Supreme Commander of the Allied Powers in the Far East. Mr. Verity retired from his post with Armco in 1948 after 44 years with the company.

Magnesium Leaders Discuss Broader Applications

○ ○ ○

Chicago

• • • **Representatives** of the magnesium industry held their fifth annual convention Apr. 19 and 20 at the Edgewater Beach Hotel here. About 150 men registered for the conference held by the Magnesium Assn. The exhibits and technical talks were featured in the two day meeting.

Tuesday's session heard W. S. Loose, sales manager, Magnesium Div., Dow Chemical Co., summarize the technological progress of the industry as well as current business conditions. H. H. Nuernberg, development division, American Magnesium Corp., delivered a paper with illustrations projected on a screen entitled "Magnesium in the Textile Industry." Mr. Nuernberg emphasized the importance of the recent perfecting of electroplating of chrome on magnesium parts which now makes possible much wider application of magnesium than heretofore.

R. T. Wood, chief metallurgist, American Magnesium Corp., spoke at the afternoon session on "Castings—Sand, Permanent Mold and Die." Mr. Wood estimated that last year the magnesium casting industry produced 8¼ million lb of the light metal. Distribution of this production was broken down by type as follows: 6,835,000 lb was sold as sand castings, 772,000 lb as permanent moldings and 607,000 lb were die castings. Mr. Loose in the morning talk had said that last year the industry produced a total of about 31 million lb of magnesium.

Mr. Wood cited the direct competition between magnesium parts and those made from aluminum and steel. He declared that the industry must stop depending so much on aircraft application. To date, Mr. Wood said, 70 to 90 pct of all magnesium produced has been for aircraft use. Recent developments and applications have started the shift of magnesium use to many other industries, and he said further the progress in this direction is essential. He cited the specific cases in which magnesium was competitive to other metals and outlined precisely why the light metal could be used in each case.

NEW OFFICERS: *New officers of the Magnesium Assn. for 1949-50 planning next year's activities are left to right: Bruce Megill, vice-president; Arthur Winston, president, and Ralph Ferguson, treasurer. Mr. Megill is manager of Dominion Magnesium Ltd., Haley, Ont. Mr. Winston is assistant to general manager, Magnesium Div. Dow Chemical Co., and Mr. Ferguson is sales manager of the Bendix Aviation Corp.*

Dr. George H. Found's paper, "Magnesium in Transportation," received very wide attention. With hauling rates so high the dead weight of trucks and trailers has become of extreme importance. Dr. Found cited the many new applications of magnesium in this industry and predicted a bright future for the light metal in this field.

Mr. Nuernberg, in his talk, criticized the fire hazard newspaper stories of the war era. He declared in most cases the stories were false or had exaggerated this danger. He said this misconception was one of the very real hurdles the industry must overcome in its effort to widen the use of the metal. He also pointed out the value of magnesium extrusions where former metals had to be machined to size. The speaker was of the opinion that much wider use of magnesium in reciprocating parts is possible, particularly in high speed machinery.

The exhibits were well attended by those of the association.

Praises Marshall Plan; American Business Men

Boston

• • • **Dr. Angelo d'Imporzano,** general manager of the Norton Co. branch, Mole Norton, at Corsico, 4 miles from Milan, Italy, who is in Worcester and plans to fly back to Italy Apr. 29, feels the economic and industrial life of Italy has been stimulated by the Marshall Plan. In fact, he is enthusiastic regarding the plan.

In Milan, for instance, he estimates that 80 pct of the bomb damage has been repaired. The Norton plant, the most up-to-date of its type in Italy, was untouched by bombs during the war. Output of the Milan branch is almost what it was before the war.

Mr. d'Imporzano is in Worcester to brush up in latest methods and trends in the manufacture of grinding wheels. Despite the competition to obtain business in Europe, American business men, he says, maintain more cordial personal relations than European, and are laying the foundation for future bookings.

Adds Fuel Oil Burners

Pittsburgh

• • • **The structural** and plate mill furnaces of the Brazilian National Steel Co., Volta Redonda, will be fitted with oil fired burners in addition to their present equipment for burning blast furnace and coke oven gas. Three furnaces are involved, according to Rust Engineering Co., Pittsburgh, which made the original installation and has been awarded a contract to furnish the additional equipment.

Industrial Briefs . . .

• MORE PIPE — Pacific States Cast Iron Pipe Co. has formally opened its $3.5 million centrifugal casting plant at Provo. It will more than quadruple producton and allow the firm to manufacture pipe of greater diameter and lengths.

• SPREADING OUT — American Steel & Wire Co. will officially open its new stainless steel wire mill on June 23 at Waukegan, Ill. The new mill employs specially designed machinery and has a capacity of 500 tons a month. Construction on the new plant began July 1946 and was completed July 1948.

• STUDENTS TOUR — The Whiting, Ind. plant of Federated Metals Div., American Smelting & Refining Co. will be host on May 18 to a group of 80 students from the Metallurgy Dept. of the Colorado School of Mines, Golden, Colo. The inspection tour, which is made annually by senior metallurgical students, will be conducted by A. S. Wigle, plant superintendent.

• GOES EAST — Permanente Products Co., Oakland, Calif., sales affiliate of Permanente Metals Corp., producers of Kaiser aluminum, has announced the opening of a sales office in the Boston Safe Deposit & Trust Co. Bldg. to service the New England area. Robert E. Belknap, Jr., formerly president of Griffin-Belknap Co., Inc., Duxbury, Mass., will head the new office.

• WIRE LEADERS — The Wire Assn., Stamford, Conn., has recently elected the following officers: president, L. D. Seymour, manufacturing manager, Wire Mills Div., John A. Roebling's Sons Co., Roebling, N. J.; vice-presidents, F. M. Crapo, president, Indiana Steel & Wire Co., Muncie, Ind., and R. B. Roth, vice-president, Ludlow Saylor Wire Co., St. Louis; secretary-treasurer, R. E. Brown, editor and publisher, Wire and Wire Products, Stamford, Conn.

• GETTING BIGGER — WAA has announced the sale of a war surplus plant located east of DeKalb, Ill., to General Electric Co. for $475,000. The property has been under lease to General Electric since February 1946. The company will continue to use the plant for the manufacture of fractional horsepower motors.

• NEW HOME—Tinnerman Products, Inc., producers of speed nut fasteners, has moved its New York district office to larger quarters at 75 Roseville Ave., Newark, N. J.

• NEW INSTITUTE — Establishment of the Resistance Welding Institute, an educational organization for the dissemination of information on technical advances in resistance welding, has been announced. Lee H. Judge, industrial public relations executive, was appointed director of the institute with headquarters in Cleveland.

• GAINS STOCK — The Production Steel Coil Co., Inc., of Detroit has acquired the stock of Seneca Steel Service, Inc., Buffalo, distributors of sheets, plates and kindred products. They will install complete facilities for a new coil department to produce coil, strip and flat wire.

• 11-YEAR BACKLOG — Draper Corp., Hopedale, Mass., has received its largest order for 14,000 looms from the Springs Mills, Lancaster, S. C. Delivery of the looms will be 100 per month starting next October and it will take Draper 11 years to complete the order.

• SOUTHWEST AGENT—Lovejoy Tool Co., Inc., Springfield, Vt., has appointed A. J. Rod Co., 924 M & M Bldg., Houston, as their exclusive representative in southern Texas for their milling cutters and other inserted-tooth type tools.

Canada Completes Deal Increasing Nail Output

Ottawa

• • • **D. A. Jones,** Canadian Steel Controller, announced that a new deal has been completed with Washington which will add 138,000 kegs of nails to Canada's supply during the next 6 months. This can be done without resorting to last year's plan of cutting back Canadian production of wire for fencing.

Easing in the supply situation in the United States on steel wire and rod used in nail production has made it possible for the authorities to drop this class of steel from the specific target arrangement worked out between Ottawa and Washington for checking and, if necessary, curbing Canadian imports.

As a direct result the Canadian Steel Controller in a recent visit to Washington was able to initiate arrangements for the importation of 1200 tons of wire and rod steel over the next 6 months when Canadian housing is at its peak. The nails will be all sizes to fit the needs of the housing program and will be distributed specifically for this purpose.

The 138,000 kegs represents about 8 pct of Canada's last year's production which totaled 1,700,000 kegs. This included 77,000 kegs produced as a result of the summer cutback on the fencing program.

Reports New Business Off

Youngstown

• • • **Youngstown Steel Car** Corp. reported 1948 net profit of $170,152, compared with $378,348 in 1947.

The profit and loss statements show a gross profit of $1,170,460 compared with $993,114 for 1947.

Edgar S. Wilkoff, president, stated in his letter to shareholders that there was a noticeable decline in the company's new business, due primarily to reduced volume in the heavy duty truck, truck trailer, and railroad fields. He said the company has enough volume of business to "warrant satisfactory operations well into the first half of 1949."

Warns Loss of Our Economic Strength From Government Encroachment In Industry

Detroit

• • • **"Unless Government** encroachment in the industrial field can be stopped, the nation will lose the vital source of its great economic strength," Walter S. Tower, president of American Iron and Steel Institute, told the Economic Club of Detroit recently.

Mr. Tower said that the so-called "steel shortage" has practically disappeared and that steel supply is no longer a problem to most consumers.

In his address, Mr. Tower called attention to the parallel between the recent problems besetting steelmakers and the automobile industry. "Steel men did all they could to eliminate the famous 'daisy chain' of gray marketeers," he said, "just as automobile people were trying to fight the zooming market in so-called new-used cars."

Completion of present plans for expansion and improvement of steel facilities may bring the U. S. annual ingot capacity to 100 million tons by 1950, Mr. Tower said. The steel industry has invested approximately $2 billion to accomplish this end, he added.

Among the technical advancements making possible increased steel production sighted by Mr. Tower are coal washers, ore sintering plants, larger and faster cranes, better charging boxes, new diesel locomotives and other items which help to increase the efficiency of existing facilities.

According to the speaker, finishing facilities for hot-rolled sheets and strip have been increased 60 pct since the prewar era. He sighted a 160 pct increase in cold-rolled facilities and 125 pct increase in the finishing capacity for cold finished bars.

In his address, Mr. Tower emphatically denied statements by prominent union leaders that the capacity figures published by the American Iron and Steel Institute were "inflated and overstated."

"The complete unreality of the attack on the accepted capacity figures is evident from the fact that production has exceeded rated capacity in every month so far this year," he said. "If anything is wrong with the capacity figure reported as of Jan. 1, 1949, the figure is too low—not too high."

Based on reports to the Institute, the automobile industry seems to have caught up with its demand except in a few lower priced lines, he told his audience. The oil industry is already confronted with overproduction, Mr. Tower said. He also pointed out that the freight car "crisis" had disappeared, and that coal and lumber are in excess of supply and farmers are today facing new restrictions to guard against too abundant harvests.

Expanding Mexican Branch

Dearborn

• • • **Ford International** plans an expenditure of $2 million for an expansion program in its Mexican branch. It is expected the new construction will permit a 50 pct increase in the output of Ford cars and trucks in Mexico.

The present plant containing 240,000 sq ft will be increased to 450,000 sq ft. Estimated capacity of the plant upon completion of the new program is 18,000 vehicles a year on one shift.

Taking New Bids for Pig

Chicago

• • • **Low bidder** on the 60,000 tons of pig iron the U. S. Army Corps of Engineers is buying in Chicago, was the Austrian Iron & Steel Co., Linz, Austria. Their bid was $55.75 per ton c&f Yokohama, Japan. Army Procurement officials in Chicago, informed THE IRON AGE last week that all bids have been rejected as the General Staff believes they can obtain a lower price. Also there was some misunderstanding as it was obvious from the bids that some sellers had included unloading charges at Japan where others had not.

New bids will be taken and must be in the hands of the procurement office of the Corps of Engineers in Chicago not later than May 2. In the new bids the sellers will be specifically requested to include unloading charges in Japan. The bid on the Austrian Iron was made by the Far Eastern Trade Co. of San Francisco.

U. S. and Canadian Ore Consumption Hits New Peacetime Peak

Cleveland

• • • **U. S. and** Canadian blast furnaces consumed 7,734,760 gross tons of Lake Superior district iron ore in March, highest peacetime consumption in history, and exceeded only by the wartime tonnages consumed in December 1942, and January and October 1943, according to the monthly report of the Lake Superior Iron Ore Assn.

March consumption of 7,734,760 gross tons was substantially higher than the 6,992,425 tons consumed in February and more than a million tons higher than March 1948, consumption of 6,634,243 gross tons.

Consumption of Lake Superior district iron ore in December 1942, totaled 7,759,366 gross tons, and in January 1943, consumption totaled 7,765,174 and October 1943 consumption was 7,750,682.

March consumption raised cumulative consumption in 1949 to 22,317,656 gross tons, compared with 20,131,496 gross tons consumed during the same period of 1948.

Consumption of Lake Superior district iron ore during the first quarter was at the rate of 90,510,000 gross tons a year.

Iron ore stocks on hand at furnaces and Lake Erie docks totaled 17,308,374 gross tons Apr. 1, compared with 24,981,208 tons March 1, and 16,022,253 tons on Apr. 1, 1948.

Active blast furnaces depending principally on Lake Superior district iron ore numbered 177 U. S. and nine Canadian, on Apr. 1. Eight U. S. blast furnaces and one Canadian furnace were idle.

Former Extra Boost Withdrawn by Great Lakes and Weirton

Detroit

• • • **Great Lakes Steel Co.** and Weirton Steel Co. have withdrawn all the increases in extras on hot-rolled sheet and strip which were made Oct. 1, 1948, according to reports from several steel consumers in Detroit. The move became effective Apr. 16, 1949. In effect, this reestablished the price level of Dec. 2, 1946.

Some of the steel firms' customers indicated the new schedules would result in savings that were estimated as high as $12-$14 per ton. Sources close to the steel companies indicated the average decrease would be substantially lower than this.

Based on reports from the trade, the extra increases which became effective last fall were applicable to length, gage and size, normalizing and pickling.

Other than a recent reduction of $1 per ton in the hot-rolled base price recently announced by Jones & Laughlin Steel Corp. this is the first substantial cut in the delivered price of mill steel reported in this area. It is anticipated, however, that extra charges by all steel suppliers will be under considerable fire here as steel users attempt to cut material costs to the bone.

Completes Cast Pipe Plant

Salt Lake City

• • • **First pipe** was cast early this month by Pacific States Cast Iron Pipe Co. at its recently completed $3½ million plant at Ironton, Utah.

This new unit with a capacity of approximately 100,000 tons of centrifugally cast pipe per year is about four times as large as the old plant which has operated for 23 years.

Foundry grades of iron will be supplied primarily from the blast furnaces of Geneva Steel Co. which, it is reported, will put its old Ironton stack on foundry iron next month.

Suspends Utility Unit

Chicago

• • • **Borg-Warner** Corp. has suspended the operations of the Ingersoll Utility Unit Division. This division has been manufacturing packaged units consisting of furnace, water heater, bath, and kitchen, together with plumbing waste and vent systems for small houses. Charles R. D'Olive, vice-president and general manager of the division said, "This action on our part is due to increasing uncertainties in the overall housing picture, together with the immediate demand for minimum units of types that we are not prepared to fabricate." It was indicated that the cleanup of the existing backlog of orders will be completed early in June, at which time production at the division's plant in Evansville, Ind., will be discontinued.

AISE Expects 1000

Pittsburgh

• • • **Over 1000 steel mill** engineers and operating supervisors are expected to attend the annual spring conference of the Association of Iron & Steel Engineers. This annual spring meeting, which is sponsored by the AISE Rolling Mill Committee, will be held at the Lord Baltimore Hotel, Baltimore, May 2 and 3. Technical papers to be presented describe technical and engineering advancements in steel mill operation.

Two inspection trips are scheduled. On Monday, May 2, the steel mill men will visit the Rustless Iron & Steel Div. of Armco Steel Corp. On Tuesday, a trip will be conducted through the Sparrows Point plant of Bethlehem Steel Co.

Stewart C. Cort, vice-president, Bethlehem Steel Co., will speak at the spring conference dinner, Monday evening, May 2.

Earnings and Sales Down

Warren, Ohio

• • • **Mullins Mfg. Corp.** of Warren and Salem reported net earnings of $748,051, or 61¢ a share, in the first three months of 1949. Both earnings and sales were lower than for the first quarter of 1948. Net sales for the first quarter were $7,919,755 and income taxes provision was $461,500.

Net income for first quarter 1948 was $1,531,683, or $1.24 a share. Net sales were $11,508,236 and provision for income taxes was $942,400.

Auto Industry Still First Among Steel Consuming Companies

New York

• • • **Among major industries** the oil and gas industries obtained the greatest increase in shipments of finished steel in 1948 over 1947, both in tonnage and in percentage of gain, the American Iron & Steel Institute announced. The total of nearly 4.3 million net tons last year for oil and gas drilling, pipe lines, refineries and associated construction was 34 pct greater than in 1947 and more than twice the 1946 tonnage.

The institute's report showed the distribution of the record total of 65,973,000 tons of finished steel shipped during 1948.

The spectacular increase in shipments of steel was a vital factor in overcoming fear of a national oil shortage and placed oil and gas as the sixth largest buyer of steel, with 6.5 pct of total shipments.

Nearly all other classes of consumers also shared in the 1948 increase in shipments of steel. The automotive industry continued in first place among manufacturing consumers, taking 10,221,000 tons, equal to 15.5 pct of total shipments. Jobbers and dealers, serving mainly the thousands of small businesses but excluding jobbers serving the oil and gas industries, received an increased tonnage last year, totaling 9,971,886 tons.

Total shipments for construction and contractors' products, exclusive of oil and gas, also increased. The total of 7,623,000 tons amounted to 11.6 pct of all shipments.

Manufacturers of appliances, utensils and cutlery received one of the largest increases, their portion of shipments moving up from 2.5 to 3.0 pct.

Railroad transportation received 5,225,000 tons in 1948, an increase of approximately 345,000 tons. That industry got nearly 8 pct of total steel, against 7.7 pct in 1947. Agricultural equipment makers received 1,427,000 tons, a tonnage larger than ever before. Nearly twice as much steel went to shipbuilding and marine equipment in 1948 as in 1947.

Alloy Steel Business Down 25 Pct from Fourth Quarter of 1948

Firms With Increased Alloy Capacity Making Bigger Efforts on Selling

By BILL LLOYD
Cleveland Regional Editor

Cleveland

• • • **Alloy steel,** prewar aristocrat and good profit maker, was hanging on the ropes this week after a first quarter battle to retain its place in the postwar steel sales pattern.

While producers hopefully predict a fourth-quarter comeback, here's how the alloy market shapes up at the moment:

Sales are off 25 pct from the last quarter of 1948.

Cancellations are running as high as 30 pct of production according to major producers.

Order backlogs have practically disappeared. As one sales executive puts it, "A lot of stuff on our books turned out to be paper. Consumers had orders on the books as protection, demand fell off and they found they could get delivery in 4 or 5 weeks. So why have protection?"

Alloy consumers in general, and forge shops in particular, are reducing substantial inventories, and as a result, alloy buying is abnormally low in relation to the total steel picture.

Mounting cost consciousness on the part of consumers and preparation for a period of price testing, as their own prices are now being tested, has much to do with liquidation of inventory. A general business decline is also blamed.

What is fundamentally wrong with the alloy market is that a number of steel companies learned how to make alloy during the war, and, while there is not numerically a much larger number of alloy producers as a result, those in the business are making a more serious sales effort than they made before the war when their capacity and investment was smaller. Thus companies that once dabbled in the alloy market acquired equipment and trained personnel, and are ostensibly in the alloy business for keeps.

As the second quarter gets underway, alloy is the enigma of the readjustment period in the steel market.

Why should alloy be so soft when other steel grades continue to move rather well?

A possible answer might be that consumers are no longer using alloy for anything except what it was made for, long-life jobs. There were many abnormal uses of alloy during the reconversion period. The day of alloy oil well country tubing, tire wrenches and kindred projects appears to be over. Consumers are getting all the carbon steel they want and are not buying a pound of alloy except for specific requirements.

Alloy production in 1948 totaled 8,482,781 tons and total steel production was 88,533,729 tons. In 1947, alloy totaled 7,345,527 tons and total steel production was 84,783,981 tons. In the first 10 months of 1948 alloy production was equal to nearly 10 pct of total output in ingots for castings. But in prewar years, alloy steel production averaged 6 pct of total steel output. Most of the gain in alloy steel production in the 10 months over the similar 1947 period was due to openhearth alloy production, rather than electric furnace output.

Within recent weeks, a number of alloy producing openhearths have been taken out of production. As alloy-making operation continues to decline, the position of the producers becomes commensurately competitive.

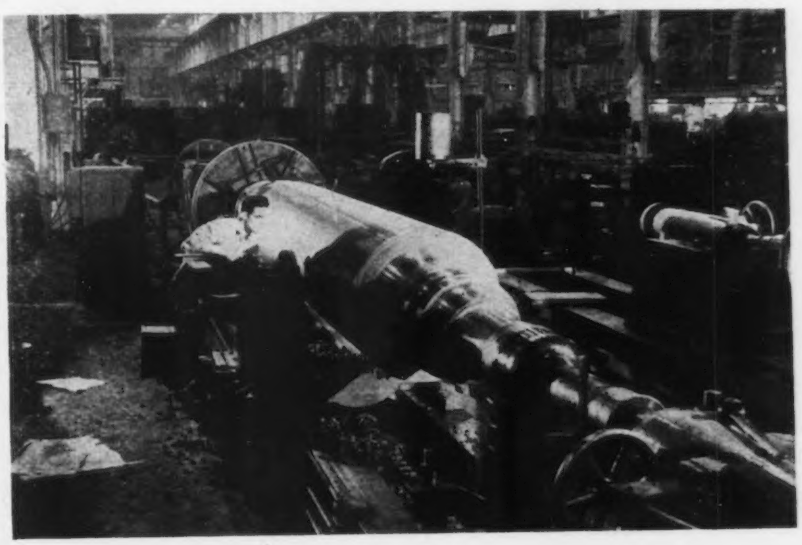
Many things might be inferred from this situation:

(1) Alloy could lead steel products back into dislocated territories. In other words, mills that have pulled out of territories because of freights might move back in first with alloy.

(2) Or it might be argued at some future date that since alloy is a premium grade, the industry should be permitted an arbitrary freight absorption.

(3) Geographical distribution of alloy production, as a result of the war, is somewhat different. New facilities will take care of consumption in areas which were supplied by remote plants

ROUTINE WORK: *Machining a field core for a 75,000-kw generator at General Electric's Schenectady plant. The steel forging is machined for 8 days by three shifts to complete this operation. From here it moves to a slotter where horizontal slots are cut the length of the steel body.*



prior to the war. On the other hand, the f.o.b. system makes alloy less competitive than prewar with carbon in areas where there is no alloy steel production.

(4) Also, there is not the market for electric furnace alloy in the quantity that present capacity will support.

Electric furnace alloy is about 20 pct of total alloy production and there is at least a $10 per ton price differential. But some alloy grades, such as bearing steels, can't be made any other way except in the electric furnace. But these comprise a relatively small tonnage.

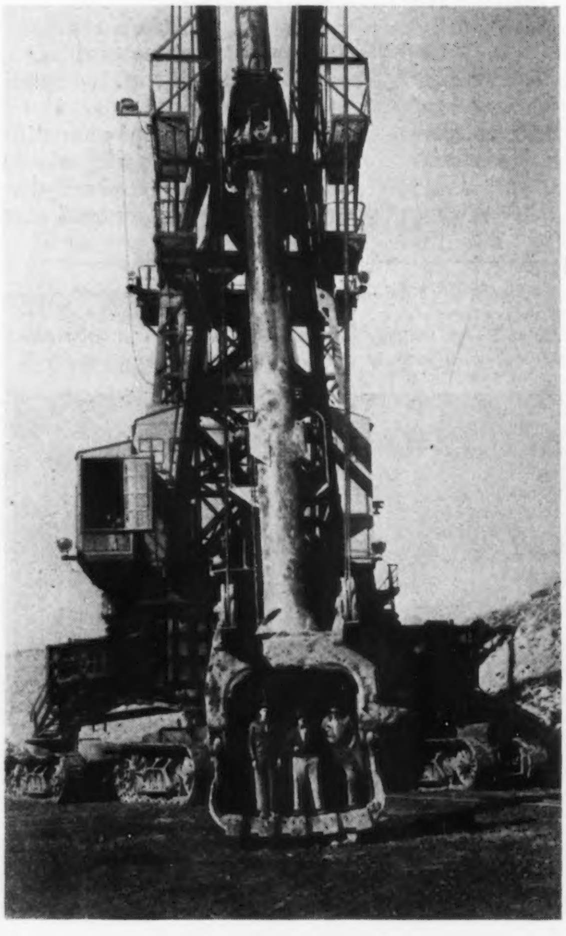
Barometer of alloy's fourth quarter future is the automotive industry, which normally accounts for about half the alloy consumption in peacetime. Use of alloy for specific jobs is not declining. There is as much or more alloy in an average automobile or tractor today as there ever was. Certainly if the automotive industry continues at its present level the alloy business, as sales people put it, "won't be too bad."

An upturn in alloy demand depends almost entirely on how auto sales at the retail level hold up through May. Rumors out of Detroit indicate that low-priced car production might peak in August.

Alloy is 10 pct below its normal relationship with carbon at the present time. If alloy demand comes back in the late third or early fourth quarter, it will probably do so in the face of a decline in carbon. Or as total steel production slides off, alloy will pick up and resume its normal relationship.

On the other hand, consumption of alloy is higher than present shipments would indicate. In fact shipments held up pretty well through February.

Warehouses are well stocked with alloy and warehouse alloy business is just about as competitive as it can get. Less than three-ton orders are back to stay.



BIG DIPPER: *On some new-type heavy power shovels, sized to take up to 36 cu yd at a single bite, the structural "dipper stick" is being replaced by a cylinder fabricated of steel plate. The cylinder on this Bucyrus-Erie stripping shovel was rolled on a 14-ft Baldwin Southwark plate bending roll. Dipper sticks have been made of 1-in. plate up to 81-ft 6-in. long, 33-in. ID, weighing 22 tons.*

ECA Advances Funds For British Cobalt Output

Washington

• • • **Under an agreement** made by the Economic Cooperation Administration, funds will be advanced to the United Kingdom for expansion of cobalt production in return for a cut in the increased output.

The ECA will finance the purchase of $550,000 worth of American machinery for expanding British cobalt producing facilities in Northern Rhodesia. In return, the United States gets a 5-year option to buy 10 pct of the increased output.

Under original expansion plans, the equipment would have been bought in the United Kingdom as they became available. The new agreement will enable the British plant, the Rhokana Corp., to complete enlargement at least 18 months sooner than planned.

Fire Destroys Patterns

Chicago

• • • **A $1 million fire** at the Hansell-Elcock Co. in Chicago, which occurred Apr. 18, destroyed the pattern storage building and the foundry office. The fire started at a loading dock in a rented area belonging to Western Material Supply Co. and swept through the core room and pattern storage department. Foundry officials told IRON AGE that they are still in operation and their first heat after the fire was tapped the morning of Apr. 20.

Patterns from about 50 companies went up in smoke. One particular pattern, foundry officials told IRON AGE, was a very intricate one which had taken 6000 man-hr to make. The gray iron and semi-steel foundry expects to be back in full operation very soon, but the completion of some orders will have to be held up pending receipt of new patterns.

Reports First Quarter Net

Cleveland

• • • **M. A. Hanna Co.** has reported net profit of $1,487,176 for the first quarter of 1949, after all charges, including depreciation and depletion and estimated provision for federal income taxes.

Scrap Subcommittee Fails to Recommend Scrap Stockpiling

Philadelphia

• • • **The proposal to stockpile** foreign scrap suffered a setback last week when the scrap subcommittee of the Iron and Steel Industry Advisory Committee adjourned without making a recommendation.

Previously, the Commerce Dept. had asked the Munitions Board to consider the advisability of such a program. The Munitions Board then called a meeting of the scrap subcommittee to draw up recommendations on the proposal. Failure of the subcommittee to submit recommendations was interpreted as a vest pocket veto, especially since no future date was set for further discussion of the matter.

The subcommittee discussed all phases of the scrap stockpiling suggestion. After the meeting Robert W. Wolcott, president of Lukens Steel Co., and chairman of the subcommittee, declared: "In view of the present instability of world scrap markets, the trend in the national inventory of metallics and the outlook for future steel mill operations and its bearing on the national inventory of metallics, the subcommittee adjourned without recommendation."

Imported German scrap is currently costing steel producers about $15 to $20 more than scrap purchased in the domestic market. In addition to this, consumers in this country have been showing little interest in buying—even at lower prices. In recent weeks there has been some investigation on the possibility of export from this country. This has resulted from the lack of consumer interest, plus dealer resentment of market conditions.

Doubles Net Income

Portsmouth, Ohio

• • • **Portsmouth Steel** Corp. set new records for net sales and earnings during the first quarter of 1949, E. A. Schwartz, president, announced in an interim report to shareholders.

Net sales of $18,166,468 in the 3 months ended Mar. 31, 1949, were approximately one third higher than the $13,692,129 reported for the corresponding 1948 period. Net earnings of $2,043,222, or $1.54 per share, after all charges in the 1949 quarter were almost double the $1,028,545, or 79¢ per share, of the similar 1948 quarter.

GIFS Plans Publication Of Gray Iron Handbook

Cleveland

• • • **Gray Iron Founders'** Society recently mailed copies of the outline of a gray iron handbook to all foundries, inviting comments, suggestions and technical data to include in this publication.

"By pooling the knowledge of the industry, data or information on the product not generally known or recorded in the literature can be incorporated in the manual, thus making it possible to draw together in one book information that is now widely scattered through the literature or only known to a comparatively few individuals," Gray Iron Founders' Society's announcement stated.

The Handbook, intended for general distribution among users of gray iron products, engineers, etc., will be especially valuable to designers and specification writers in selecting materials for the design of industrial machinery and equipment and will constitute a compendium of all available authoritative information on gray iron.

Current Business Off, Long Term Good—Batcheller

Pittsburgh

• • • **Hiland G. Batcheller,** Allegheny Ludlum Steel Corp. president, last week frankly told plant foremen and plant community leaders that business was off and competition a lot tougher than it has been. He made no short term predictions but expressed confidence in long-term prospects.

The company viewpoint on this and on other questions of interest to the workers and the community was presented by special meetings, first with foremen and other supervisors of each plant and later at dinner meetings with the townspeople in each community. The company's annual report was dramatized in "Star Bright," a 20-min motion picture, after which each meeting was thrown open for company executives to answer questions from the audience.

The program was presented in four communities where Allegheny Ludlum operates plants: West Leechburg and Brackenridge, Pa., Dunkirk and Watervliet, N. Y. At Brackenridge there was an added feature: a dinner given the union by the management, returning one given by the Steelworkers for foremen and supervisors in 1948.

Next the Allegheny Ludlum management team drove over to Dunkirk and Watervliet, N. Y., where the process of telling the company's annual report story and exposing its officials to any and all questions on policy and politics continued.

Foremost among the questions asked by foremen and community leaders were those on business prospects. The steel people didn't attempt crystal ball gazing on the immediate outlook. "We are in the middle of something and we don't know what it is," A-L's president said. "We all hope it will be of short duration."

On long-term prospects the outlook was bright, Mr. Batcheller declared, alluding to the constant development of new applications for stainless and special steels. He pointed to a new stainless hypodermic syringe using air pressure instead of a needle, to an acid carboy designed to replace glass containers and to a stainless milk can to compete with the present tinplated product. These, he said, are a few examples of how A-L hopes to level off some of the valleys characteristic of steel operations.

Labrador Iron Ore Reserves Increased With New Deposits

Toronto

• • • **J. R. Timmins,** president of Labrador Mining & Exploration Co. Ltd., in the company's annual report says that a total of some 101,054,000 long tons of good grade iron ore have been located in 10 deposits by drilling to the end of 1948 at the property in the Labrador area of Canada.

Approximately 60,000,000 tons of ore were added during the past year and drilling to date in Quebec has indicated some 222,774,000 tons of ore in 15 deposits.

Sufficient tonnage now has been proved to justify the necessary expenditures to bring the properties into operation. It is estimated that an expenditure of $200 million will be required for a railroad, railroad and mining equipment, power development, dock construction and other facilities. The report states that this will require a number of years, but in the opinion of the company the discovery is of such importance and the possibilities of finding new ore are so great that the time and money spent are justified.

Plans for financing the undertaking are yet to be formulated. It will be necessary to dispose of substantial tonnages of ore in the United States annually, as this is the only market where large tonnages can be sold at present.

However, the report says, no matter what form the financing takes, an ample supply of iron ore will be reserved for the needs of Canada and the United Kingdom for a long time to come.

Final location of the proposed railway has been run on 100 miles of the rougher section between Seven Islands and Wacouna Lake near the height of land. The location parties will continue their work through the summer.

Total Iron and Steel Exports Up for Jan. Some Scrap Shipped

Washington

• • • **Exports of iron** and steel during January dropped slightly to 420,344 net tons, but the addition by the Commerce Dept. of 14 iron and steel products to the monthly export report form brought the total to 457,033 net tons, as compared with 422,191 tons during December.

In addition to the total for the month of 457,033 tons, the department reported export of 17,543 net tons of iron and steel scrap during January. Previous export reports from the agency did not list scrap export tonnages because the volume shipped was nil or insignificant.

The 12 iron and steel products added to the department's report form are tanks (complete and knocked down), metal lath, tin and galvanized hollow ware, tin cans (finished or unfinished), malleable iron screwed pipe fittings, cast iron screwed pipe fittings, cast iron pressure pipe and fittings, cast iron soil pipe and fittings, iron castings and ingot molds, steel castings, sprocket and other power transmission chains, other chains, pig iron, and ferroalloys.

Net tonnages of all iron and steel products exported during January are:

Semifinished and Finished Products:	
Ingots, blooms, billets, slabs, sheet bars	17,363
Wire rods	2,562
Skelp	5,587
Iron bars	202
Concrete reinforcement bars	10,388
Steel bars, cold-finished	32,974
Other steel bars (excluding alloy)	27,912
Alloy steel bars	2,085
Welding rods, electric	1,060
Plates including boiler, not fab	26,398
Plates, fab., punched or shaped	3,135
Iron sheets, black	1,910
Steel sheets, black	39,338
Galvanized sheets	5,908
Strip steel, cold-rolled	5,871
Strip steel, hot-rolled	8,308
Tin plate	53,083
Terne plate	1,199
Structural shapes, plain	27,194
Structural shapes, fab.	18,187
Frames and sashes	175
Sheet piling	1,628
Rails, 60 lb per yard and over	17,466
Rails, less than 60 lb per yard	1,861
Rails, relaying	1,242
Splice bars and tie plates	1,134
Frogs and switches	437
Railroad spikes	265
Railroad bolts, nuts, and washers	163
Car and locomotive wheels, tires and axles	3,908
Seamless black pipe and tubes	2,948
Seamless casing and line pipe	30,426
Seamless boiler tubes	4,368
Welded black pipe	7,151
Welded galvanized pipe	7,713
Welded casing and line pipe	9,362
Welded boiler tubes	407
Other pipe and fittings	6,929
Plain wire	7,726
Galvanized wire	4,965
Barbed wire	4,216
Woven wire fencing	1,864
Woven wire screen cloth	600
Wire rope and strand	1,354
Wire nails	1,923
Other wire and manufactures	2,301
Tacks	271
Other nails, incl. staples and horseshoe nails	1,276
Bolts, nuts, rivets and washers, except railroad	3,139
Forgings	2,447
Horseshoes	15
TOTAL	420,344
Other Finished Products:	
Tanks, complete and knocked down	12,512
Metal lath	1,009
Tin and galvanized hollow ware	403
Tin cans, finished or unfinished	6,702
Malleable iron screwed pipe fittings	521
Cast iron screwed pipe fittings	193
Cast iron pressure pipe and fittings	3,387
Cast iron soil pipe and fittings	674
Iron castings and ingot molds	4,188
Steel castings	160
Sprocket and other power transmission chains	459
Other chains	655
TOTAL	30,863
Pig iron	1,063
Ferroalloys	4,763
TOTAL	5,826
GRAND TOTAL	457,033
Iron and steel scrap	17,543

Coming Events

May 2-3	**Assn. of Iron & Steel Engineers**, annual conference, Baltimore.
May 2-4	**American Society of Mechanical Engineers**, spring meeting, New London, Conn.
May 2-5	**American Foundrymen's Society**, annual convention, St. Louis.
May 4-7	**Electrochemical Society**, semiannual meeting Philadelphia.
May 5-6	**American Society for Quality Control**, annual convention, Boston.
May 11-13	**National Welding Supply Assn.**, annual convention, Cincinnati.
May 12-13	**Rail Steel Bar Assn.**, annual meeting, Chicago.
May 12-13	**Instrument Society of America**, spring meeting, Toronto.
May 18-20	**National Steam Specialty Club**, annual meeting, Skytop, Pa.
May 19-21	**Society for Experimental Stress Analysis**, spring meeting, Detroit.
May 23-24	**American Steel Warehouse Assn.**, annual meeting, Atlantic City, N. J.
May 23-25	**American Gas Assn.**, production and chemical conference, New York.
May 25-27	**Gas Appliance Manufacturers Assn.**, annual meeting, Chicago.
May 25-27	**Machinery Dealers National Assn.**, annual meeting, Virginia Beach, Va.
May 30-June 1	**Metal Treating Institute**, spring meeting, Quebec.
June 16-17	**Malleable Founders Society**, annual meeting, Hot Springs, Va.

Zinc Price Reduction Reflected in Lower Quotations for Pipe

New York

• • • **Reflecting reduction** in price of zinc, U. S. Steel Export Co., U. S. Steel subsidiary, announces the following new prices with freight to New York, Philadelphia or Baltimore.

These prices will apply on carload lots and are effective with shipments made from the mills on and after 12:01 a. m. Apr. 15, 1949. These prices are subject to sellers' current list of extras and deductions and conditions of sale. All sales are subject to seller's prices in effect at time of shipment.

American Standard Pipe, T & C	
Buttweld, 2½" and 3" Galvanized	23.6%
Seamless, 3½" to 6" Galvanized	16.1%
English Gas Tubes, T & C	
Buttweld, 2½" and 3" Galvanized	25.5%

Changes Policy on Sheaves

Milwaukee

• • • **Allis-Chalmers** Mfg. Co. has announced that it is discontinuing the manufacture of adjustable threaded plate sheaves in the larger sizes with the recommendation that Vari-Pitch sheaves be substituted. The company states that the reason for the new policy is that users have tended to overload the larger size adjustable sheaves (6.300 up to 7.300 in. outside circumference) without properly anchoring the adjusting plates.

Allis-Chalmers engineers recommend that when the horsepower of an adjustable speed drive exceeds 2 or 3, depending upon the application, a stationary control Vari-Pitch sheave be used instead.

Net Profits Decline

Chicago

• • • **The directors** of A. M. Castle & Co., a large Chicago warehouse, have declared a regular quarterly dividend of 50¢ per share on common stock outstanding of 240,000 shares. Payment is to be made May 10 to stockholders of record Apr. 30, 1949. Net profits for the company during the first quarter were $216,530 or 90¢ per share after all charges, including estimated Federal income tax, were deducted. This compares with a net profit of $364,613 or $1.52 per share for the same period in 1948.

Furnace Changing Hands

Pittsburgh

• • • **Kaiser & Frazer** Parts Corp. is in the process of turning its Struthers, Ohio, blast furnace back to Struthers Iron & Steel Co. The Struthers company operated the furnace prior to Oct. 1, 1947, when it was taken over by the automobile company to expedite its raw materials supply.

The furnace is now out for relining and will probably not be returned to production for at least a month. It has some iron in stock now. It is expected that Struthers will offer malleable and foundry iron when it resumes operations. It is rated at 182,500 net tons of pig iron annually.

Jessop Prepares to Meet Competitive Market

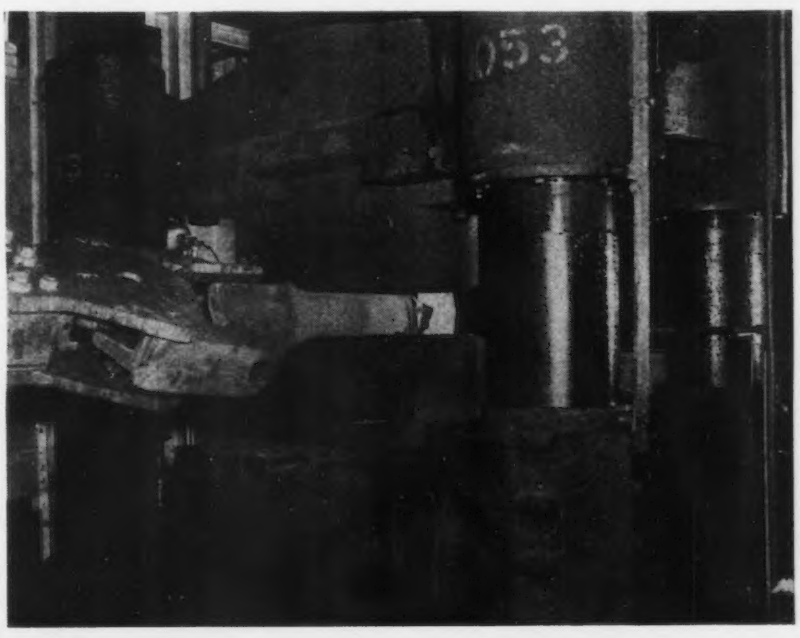
Washington, Pa.

• • • **Jessop Steel** Co. has installed a new forging press to do most of the work formerly done on the blooming mill but this is only one of the obvious changes that have taken place here during the past few months.

The company has been reorganized from top to bottom with sweeping changes in personnel and equipment in a move designed to improve its competitive position in the stainless, tool and specialty steel fields. Some new equipment has been installed in the shops and the location of older units has been shifted to step up efficiency. Upon observation it appears that the same tonnage of steel can be turned out today with half the number of shop employees formerly required.

Biggest of the new equipment items is a 1500-ton hydraulic forging press. It will not only lower the cost of converting ingots into billets, rounds and flats but reduce the chances for checks or cracks on the steel's surface. C. A. Gordon, operating vice-president, is authority for this statement. He also sees a reduction in grinding costs.

Installed with the new press are two ingot soaking pits, with walls of Pyrofac on concrete instead of refractory brick. A new manipulator serves the press and a reheating furnace has also been installed.



Canadian Production; Shipments Rise For Iron and Steel Shapes

Toronto

• • • **Canadian production** of primary iron and steel shapes for the month of January 1949, totaled 321,337 net tons as compared with 300,585 tons in December and 290,840 tons in January 1948. Output for January included 313,660 tons of carbon steel shapes and 7677 tons of alloy steel shapes. In the production figures for January are included 89,761 tons of shapes shipped to producers' own plants or plants within the primary industry for further processing.

Shipments for sale of primary iron and steel shapes in January amounted to 233,548 net tons, of which 224,910 tons were carbon steel shapes and 8638 tons alloy steel shapes; in December shipments totaled 212,886 tons and included 199,703 tons of carbon and 13,183 tons of alloy steel shapes, and for January 1948, shipments amounted to 231,329 tons and included 220,723 tons of carbon and 10,606 tons of alloy steel shapes. The above figures which show iron and steel shapes for sale do not include deliveries for further processing.

First Quarter Net Up

Birmingham

• • • **Net income** of Sloss-Sheffield Steel & Iron Co., Birmingham, for the first quarter of 1949 after estimated Federal income taxes was $875,339.89, compared to $529,819.47 for the first quarter of 1948.

Dividends paid during the first quarter of 1949 on common stock amounted to $248,295. The total for the first quarter of 1948 amounted to $198,636.

The following table shows production and shipments for sale of primary iron and steel shapes for the month of January in net tons:

Item	Carbon Steel		Alloy Steel	
	Made	Shipped	Made	Shipped
Billets, etc., for forging	11,604	7,428	536	490
Other semifinished shapes, not for re-rolling by makers	47,496	296	187	...
Structural shapes and piling	17,220	17,265	...	...
Plates	19,079	19,163	232	321
Rails	30,960	33,200	...	...
Tie plates and track material—				
Splice bars	3,665	3,052	...	...
Tie plates	1,706	1,731	...	...
Spikes	1,002	981	...	...
Concrete reinforcing bars	9,103	7,690	...	...
Hot-rolled bars for cold finishing	338	...	...	...
Other hot-rolled bars	44,232	40,869	4,935	6,076
Pipes and tubes	16,710	13,219	...	...
Wire rods	26,918	25,488	56	52
Hot-rolled black sheets	15,035	12,924		...
Cold-reduced black sheets	7,709	5,495	...	...
Galvanized sheets	8,219	7,722	...	...
Steel castings	7,587	7,255	1,142	1,073
Miscellaneous hot-rolled products	29,000	5,036	242	285
All other products	16,077	16,096	347	341
TOTAL	313,660	224,910	7,677	8,638

Producers' shipments of primary iron and steel shapes subdivided according to principal consuming industries for the month of January, in net tons, follow:

ITEM	CARBON STEEL	ALLOY STEEL
Automotive industries	6,044	5,335
Agricultural, including farm machinery	10,272	67
Building construction	32,058	49
Containers industry	15,227	2
Machinery and tools	10,566	581
Merchant trade products	31,251	167
Mining, lumbering, etc.	7,808	448
National defense	148	...
Pressing, forming and stamping	9,737	62
Public works and utilities	1,178	29
Railway operating	32,311	164
Railway cars and locomotives	16,099	429
Shipbuilding	2,072	180
Miscellaneous and unclassified	1,113	98
Wholesalers and warehouses	28,724	377
Direct export (a) to British Empire	15,217	197
(b) to other countries	5,085	453
TOTAL SHIPPED FOR SALE	224,910	8,638
Producers' Interchange	89,574	187

Industry Asks Truck Load Increase in Pennsylvania

Pittsburgh

• • • **Pennsylvania industry,** surprised by secret-session action that pigeonholed a bill to revise truck weight rules, moved last week to revive the bill. The proposed law, dubbed the "big truck bill," would increase legal weights for certain truck trailer combinations from $22\frac{1}{2}$ to 30 tons.

A petition in favor of the bill signed by 34 big companies was sent to the state legislature at the same time that Adm. Ben Moreel, president of Jones & Laughlin Steel Corp., declared the failure to pass the bill would handicap Pennsylvania steel plants in competing with mills in surrounding states.

Steel company traffic men told THE IRON AGE that they are having some difficulty securing trucks to ship steel in Pennsylvania because the same vehicles can haul 15,000 to 29,000 additional lb in neighboring states. Though the new Pennsylvania bill proposes a maximum weight increase from 45,000 to 48,000 lb for single unit type trucks, and from 45,000 to 60,000 lb for tractor trailers, there would be no increase in the maximum load limit per wheel or per axle.

Along with the increase it was proposed to levy stiffer fines for overloading. Overloading, often by as much as 15 tons, has been frequent, but the maximum fine is only $50. Asked by THE IRON AGE what load his trucks could carry, a big operator asked, "Do you mean legally?"

ECA Funds for Italy

Washington

• • • **Some 70 billion lire** ($120 million) in Italian counterpart funds have been released by ECA for reconstruction of Italian railroads.

A portion of the funds will be spent in purchasing 313 coaches and 2173 freight and baggage cars, all to be bought in Italy. The remainder of the allocation will be spent for repairs and improvement to the Italian lines.

Construction Steel . . .

• • • **Fabricated steel awards** this week included the following:

2200 Ton, Island Heights, N. J., bridge, through Ole Hansen, Pleasantville, N. J., to Bethlehem Steel Co., Inc., Bethlehem.

1450 Tons, Alma, Nebr., C.B.A.&Q. Railroad relocation project to Kansas City Structural Steel Co., Kansas City.

760 Tons, Grand Island, Nebr. highway bridge to Bethlehem Steel Co., Inc., Bethlehem, Pa.

425 Tons, Hempstead, L. I. F. W. Woolworth Co., to Grand Iron Works, Inc., New York.

130 Tons, Sulphur, La., bridge for State of La. Highway Department, to Virginia Bridge Co., Birmingham.

115 Tons, Great Barrington, Mass., furnishing, fabricating and erecting steel truss bridge on Brookside Road over Housatonic River to American Bridge Co., Pittsburgh.

115 Tons, Hudson, Wis., bridge section F1-06-05-9 foundation work through Industrial Contracting Co., of Minneapolis to Milwaukee Bridge Co., Milwaukee.

100 Tons, Leominster, Mass., new W. T. Grant store through J. W. Bishop, Worcester, to Groisser & Shlager Iron Works, Somerville, Mass.

• • • **Fabricated steel inquiries** this week included the following:

5600 Tons, Philadelphia, Pier 80 South, Hughes Foulkrod Co., Philadelphia, low bidder.

4200 Tons, Allegheny Co., Pa., bridge superstructure, Pa. Dept. of Highways, due May 6.

785 Tons, Riverside Co., Calif., overheads over tracks of A.T.&S.F. R.R., bridge across Santa Ana River, and highway separation over Rt. 43, near Corona, Calif., Div. of Highways, Los Angeles, bids to May 19.

700 Tons, Bridgeton, N. J., 3 warehouses for Owens-Illinois Glass Co.

600 Tons, Woodville, Pa., Woodville State Hospital, due May 4.

185 Tons, Seymour, Conn., reinforced concrete pavement and 2 steel plate girder bridges. Mariana Construction Co., Inc., New Haven, Conn., low bidder.

175 Tons, Edgemoore, Del., turbo-generator substation, Delaware Power & Light Co., due May 5.

105 Tons, Sussex Co., N. J., bridge, N. J. Dept. of Highways, due Apr. 28.

• • • **Reinforcing bar awards** this week included the following:

1200 Tons, Brighton, Mass., building for Hathaway Bakeries, Inc., through Edmund J. Rappoli Co., Cambridge, to Bethlehem Steel Co., Inc., Bethlehem.

350 Tons, Danville, Pa., admission building, Danville State Hospital, through S. H. Evert Co., Bloomsburg, Pa., to Bethlehem Steel Co., Inc., Bethlehem.

335 Tons, Island Heights, N. J., bridge, Route 37, through Ole Hansen, Pleasantville, N. J., to Bethlehem Steel Co., Inc., Bethlehem.

235 Tons, Chicago, Elmhurst, Ill., junior high school building, through Patrick Warren Construction Co., Chicago, to J. T. Ryerson & Sons, Chicago.

170 Tons, Kingston, R. I., 2 dormitories for Rhode Island State College through Edmund J. Rappoli, Cambridge, to Bethlehem Steel Co., Inc., Bethlehem.

100 Tons, Sunbury, Pa., Sunbury Community Hospital, through Ritter Bros., Harrisburg, Pa., to Bethlehem Steel Co., Inc., Bethlehem.

• • • **Reinforcing bar inquiries** this week included the following:

1200 Tons, Philadelphia, Penrose Ave., bridge superstructure, due Apr. 29.

1300 Tons, Madison, Wis., Veterans hospital.

600 Tons, Philadelphia, Pier 80 South, Hughes-Foulkrod Co., Philadelphia, low bidder.

435 Tons, Mankato, Minn., high school building Hagstrom Contracting Co., of St. Paul, low bidder.

310 Tons, Oakland, Calif., pumping plant, etc., East Bay Municipal Utility District, Sanitary District No. 18, bids to May 11.

300 Tons, Chambersburg, Pa., Chambersburg State Hospital, McCloskey & Co., low bidder.

270 Tons, Riverside Co., Calif., overheads over tracks of A.T.&S.F. R.R., bridges across Santa Ana River and Oakwing Creek, and highway separation over Rt. 43, near Corona, Calif. Div. of Highways, Los Angeles, bids to May 19.

110 Tons, Boston, construction facilities for Mystic River Bridge between Chelsea and Boston. Completion date Dec. 1, 1949.

105 Tons, Mohave Co., Ariz., construction on Topock-Kingman Highway, near Kingman, Arizona State Highway Commission, Phoenix, bids to Apr. 29.

• • • **Sheet steel piling** inquiries this week included the following:

1700 Tons, Chicago, Foster Ave. to Hollywood Extension Drive for Chicago Park Disttrict.

120 Tons, Centerton, N. J., Burlington County bridge pier repairs, due May 6.

• • • **Plate awards** this week included the following:

200 Tons, Milwaukee, 400 ft. of welded pipe for the Milwaukee Gas Light Co. to A. O. Smith Corp., Milwaukee.

Northern Iron Deposits May Benefit Railroad

Boston

• • • **Huge iron deposits** in northern Quebec and Labrador are the source of great interest on the part of leading United States steel companies and this may affect the Boston & Maine R.R., George Sakis, Washington attorney and engineer, recently testified at Hotel Lenox at a hearing to consider the revised plan of modification of the capital structure of the B & M. Homer H. Kirby, Interstate Commerce Commission examiner, heard the testimony.

"These deposits may help the B & M in the future," Mr. Sakis said. "I believe that the B & M has great strategic value, potentially because of these vast iron ore deposits in the north country."

The B & M has connections with Canadian railroads which extend to the St. Lawrence Gulf area, and these rail-heads are in clear proximity to the "great empire" to the north.

50 YEARS AGO

THE IRON AGE, *April 27, 1899*

• "The American Shipbuilding Co., who were organized at a meeting in New York City last week and whose headquarters will be in this city, will at once assume the active management of the shipbuilding plants and dry docks aquired by the consolidation."

• **"It is stated that at the Youngstown works of the National Steel Co., at Youngstown, Ohio, there were turned out in March about 43,000 tons of ingots."**

• "The Pittsburgh Forge & Iron Co. of Pittsburgh have recently made a shipment of a considerable quantity of high grade iron bar to Kobi, Japan."

• "The Pittsburgh Machine Tool Co. of Pittsburgh have been granted a charter of incorporation with a capital of $250,000. The concern will erect in Allegheny, Pa., a plant for the manufacture of machine tools."

• **"Report has it that Cambria Steel Co. of Johnstown are to erect two large modern blast furnaces."**

• "Ferromanganese — The two Lucy furnaces in Pittsburgh belonging to the Carnegie Steel Co., Ltd., are now both running on Ferro. Prices are firm, and we quote large lots at $75. Some small lots for early shipment are reported to have sold at considerably higher prices."

Warns on Coal Wage Hike

Pittsburgh

• • • **A stiff battle** over coal wages is in sight if the country's largest independent coal producer has anything to say about it. George H. Love, president, Pittsburgh Consolidation Coal Co., warned last week that the industry is in a receding market and can not afford to raise wages this year. In fact, there must be sharply increased productivity to cover wage increases already granted, Mr. Love added, in a statement at the company's annual stockholders' meeting.

Predicting 1949 coal output of 500 million tons if the industry is not too harassed with strikes, Mr. Love blamed the expected drop of 90 million tons below 1948 production on: Faster than expected dieselization of railroads, losses to competitive fuels, the drop in exports and a general slackening in industrial activity.

New Pittsburgh Product

Pittsburgh

• • • **The Allis-Chalmers** Pittsburgh plant has begun manufacturing unit substations formerly produced at Milwaukee. The first to leave the Allis-Chalmers factory here was made for West Penn Power Co. for installation at Cheswick, Pa.

A packaged substation, it contains a transformer, load ratio control equipment, switchgear and relays. It can be installed, energized and ready for service in a day. The new product will help relieve the rapidly growing demand on electrical energy in the Pittsburgh area.

Lone Star Holds Meeting

Dallas

• • • **On Apr. 19** the Lone Star Steel Co. stockholders held their second annual meeting here. The present members of the board of directors were reelected and W. O. Irvin was appointed to a vacancy on the board created by the resignation of R. W. Wortham. All actions of the management during the past year were ratified and directors were authorized to accept or reject the RFC loan for funds to build a new steel mill not to exceed $75 million.

Following the stockholders' meeting the board of directors reelected all present officials and appointed C. E. Owen chairman of the board, who replaces Mr. Carpenter, former chairman, who resigned in March.

Earnings Set '48 Record

Warren, Ohio

• • • **Copperweld Steel** Co. has reported 1948 net earnings of $4,989,019, an all-time high, compared with earnings of $1,546,711 in 1947, its second best year.

Copperweld's annual report stated that 1948 earnings were before deducting $1,200,000, provided for losses which may result from a deline in inventory value and other contingencies.

Copperweld's 1948 sales marked a new high, totaling $75,570,115 compared with $53,303,245 in 1947, and with $35,396,142 in 1944, third best year in the company's history.

The report stated that a part of the increase in net sales may be attributed to increased costs of certain raw materials. Scrap costs at the steel division at Warren rose from an average of $41.18 a ton in 1947 to $49.89 in 1948. The report said record-breaking operations of both the Glassport and Warren divisions continued in the first three months of 1949.

Thomas Steel Reports Net

Warren, Ohio

• • • **Thomas Steel Co.** reported net income of $468,642, or $1.33 a share, for the first quarter of 1949, the second-best quarter in the company's history. Net income in 1948 first quarter was $411,606 or $1.16 a share.

Gross sales in the first quarter of 1949 were $3,121,505. Provision for federal income taxes was $287,300. Wages, salaries and taxes other than income taxes accounted for $330,740.

The company's position, it was reported, was unusually liquid, with the ratio of current assets to current liabilities 4½ to one. Current assets were $3,160,393; current liabilities $700,364.

Speeds Welding 25% with Heavier Current

By DELBERT CRAVEN, Supt.
The Alliance Structural Co.
Alliance, Ohio

Delbert Craven

We fabricate many different types of cranes ranging up to 300 tons capacity. Most of these structures involve heavy, boxed-up sections on which arc blow seriously limited the amount of current and the welding speed that could be used. By installing 500-amp. AC "Fleetwelders" for this work, we have eliminated arc blow, and the operators are now able to boost their welding current from 300 to 385 amperes, resulting in 25% faster welding. Moreover, the welds are of higher quality and easier to make.

The crane girder shown in Fig. 1 is typical of the kind of weldment now being fabricated in our shop. The top and bottom plates are ⅞" plate, fillet welded to 5/16" side plates with large diameter ¼" "Fleetweld 7" electrodes. Many of the welds on this 85 ft. crane girder are single pass 5/16" fillets requiring heavy sustained welding at high currents (Fig. 3).

Substantial savings in idle power losses are further helping to cut our costs on these jobs. Where the idle factor is high, such as leaving the welder connected to the line while fitting up parts, considerable cost savings are made since the "Fleetwelders" draw far less current from the line than the motor driven equipment formerly used.

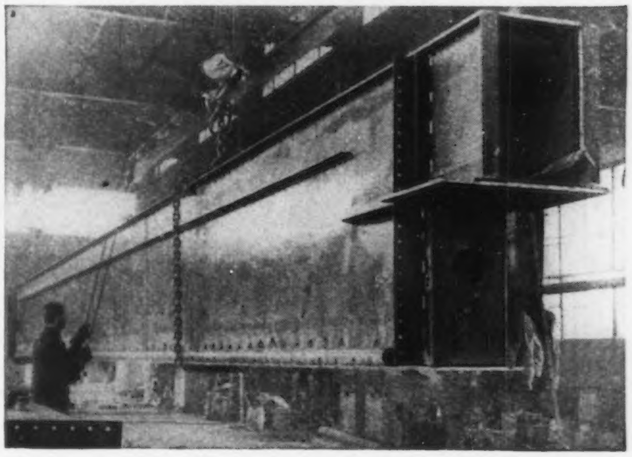


Fig. 1. Girder for 60-ton capacity crane AC weld fabricated with the new Lincoln "Fleetwelder." Top and bottom plates are ⅞" steel . . . sides are 5/16" plate. Girder is 85 ft. long, 76 in. high and 28 in. wide . . . weighs 20 tons.

A comparison of the all welded crane girder with similar size riveted designs shows a saving of 20% in weight. This weight saving is largely the result of eliminating connecting members and rivets by arc welding.

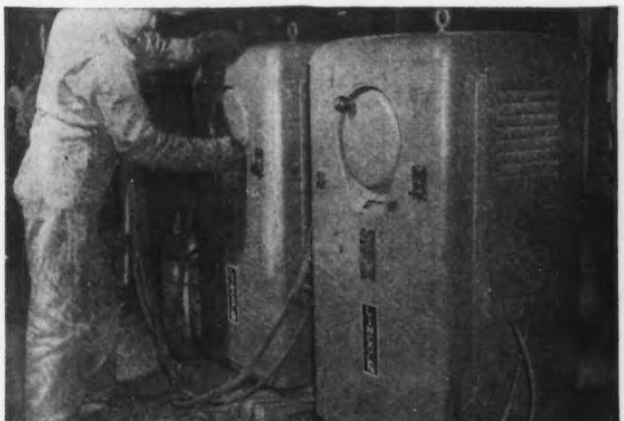


Fig. 2. Setting correct welding current with Continuous Current Control on the 500-amp. Lincoln "Fleetwelder" AC arc welder. "Fleetwelder" has exclusive "Arc Booster" that makes arc striking easy on all types of work.

Fig. 3. Fillet welding rope guard of 5" pipe to bottom plate with ¼" "Fleetweld 7" electrode and using 385 amps. welding current. Fillet welds are single pass 5/16" continuous and intermittent

The above is published by **THE LINCOLN ELECTRIC COMPANY** *in the interests of progress.*
For further information on the "Fleetwelder," write for Bul. 366. The Lincoln Electric Company, Dept. 55, Cleveland 1, Ohio.

FEATURE CONTINUATION

Colorimetric Methods of Analysis

(*Continued from page* 90)

BORON

(*6*) ***In steels:***

Dissolve with H_2SO_4 under condenser. Filter. Fuse precipitate with Na_2CO_3, then acidify. Determine B in each portion with quinalizarin in 98.5 pct H_2SO_4.

Interfering elements: High As.

References:

Karr, H. A.; Metals and Alloys, 9,175 (1938).

Rudolf, G. A., and Flickinger, L. C.; Steel, Apr. 5, 1943.

Weinberg, S., Proctor, K. L. and Wilner, O.; Ind. Eng. Chem., Anal. Ed., 17,419 (1945).

(6a) In alloy steels:

Prepare solutions as in (6). Combine. Remove interfering elements with mercury cathode. Complete as in (6).

CADMIUM

(*7*) ***In steels:***

Dissolve with HCl plus small amounts of HNO_3. Adjust acidity to 2 ml HCl per 100 ml. Pass in H_2S until solution is nearly colorless. Add 2 mg $AgNO_3$ as gathering agent. Filter. Dissolve precipitate off paper with HCl-Br wash. Boil out Br. Filter any AgBr. Adjust to pH 12. Extract Cd, Pb, etc. with dithizone. Wash with 0.2N HCl to remove Cd, Pb, etc. Add alkaline tartrate (pH 12) and extract with dithizone. Re-extract into acid solution with 0.2N HCl. Make ammoniacal and extract with di-β-naphthylthiocarbazone. Remove excess reagent with NH_4OH. Determine Cd at 540 mμ.

Interfering elements: None.

References:

Cholak, J. and Hubbard, D. M.; Ind. Eng. Chem., Anal. Ed., 16,333 (1944).

Wichmann, H. J.; Ind. Eng. Chem., Anal. Ed., 11, 66 (1939).

(7a) In copper alloys:

Dissolve in HNO_3. Add excess NaCN. Precipitate Cd and Pb as sulfides. Dissolve precipitate off paper with HCl-Br wash. Boil out Br. Adjust to pH 12. Complete as in (7).

(7b) In lead-tin alloys:

Dissolve in HNO_3. Filter off Sn and Sb. Volatilize as in (7d). Save residue. Fume filtrate with H_2SO_4 and remove Pb. Combine residues. Adjust acidity to 2 ml HCl per 100 ml. Precipitate CdS. Dissolve off paper with HCl-Br. Complete as in (7).

(7c) In silver alloys:

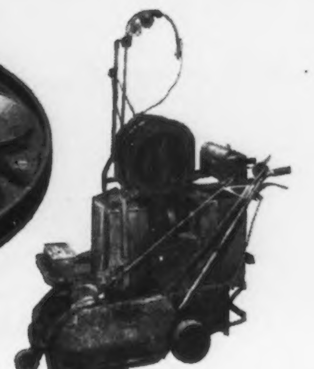
Dissolve in HNO_3. Separate bulk of Ag as insoluble chloride. Add excess NaCN. Precipitate Cd, Pb, Ag as sulfides. Complete as in (7a).

(7d) In tin alloys:

Add HCl, HBr and $HClO_4$. Volatilize as much As and Sn as possible. Dilute and filter remainder. From filtrate, elec-

METAL CLEANING *News*

Profitable Ideas That Work with WHEELABRATOR Airless Blast Cleaning



Above: Miscellaneous parts of a scrubbing machine after Wheelabrating.
At right: A Finnell floor maintenance machine prior to reconditioning.

CLEANING a Cleaning Machine

Periodic reconditioning of floor cleaning machines, by thorough cleaning and readjustment, is an essential part of the nationally known Finnell System of floor maintenance.

For many years the first step in the process—removing rust, scale, old paint and other foreign material—was accomplished by wire brushing—a laborious, time-consuming job that took a full eight hours. Installation of a 66″ Wheelabrator Swing Table cut the time on this operation to less than one hour. Result: Labor costs reduced 90%; production rate increased 700%.

Avoiding Pipe Line Leakage

The high pressures, which send the nation's oil surging through thousands of miles of pipe line, is sufficient to spring serious leaks if the lines are weakened by rust or corrosion. Wheelabrating has helped the pipe line operator to solve this problem both in the case of new pipe and in the case of old pipe which has been taken up and relaid.

The thorough cleaning and slight roughening action of the abrasive blast provides an immensely better bond for the protective coating. In the case of old pipe, the abrasive blast scours away every trace of dirt and scale from the surface and reveals the true condition of pits and other defects.

A New Face For Cold Reduction Rolls

Tennessee Coal Iron & R. R. Co. reports a 35% increase in the service life of their cold reduction rolls since the installation of their new Wheelabrator roll dressing machine. Completely automatic in operation, the machine requires no special skill or judgment on the part of the operator and the resulting roughening is extraordinarily deep and uniform, even for the hardest rolls. Using one Wheelabrator unit, the actual blasting time is 3 minutes per roll, as compared to 20 minutes by airblasting.

Coffee-maker Maker Gets Production Percolating

In the manufacture of a stainless steel wire grid assembly, for use in commercial coffee-makers, a lead coating deposited on the part must be completely removed before the grid is incorporated in the finished product. To do this quickly and thoroughly the Hunter Pressed Steel Co. of Lansdale, Pennsylvania, uses a 27″ x 36″ Wheelabrator Tumblast. After cleaning, the grids are passivated to prevent corrosion.

Steel Drums Go To The Cleaners

Paint, rust and old coatings are removed from 120 to 200 steel drums hourly in a Wheelabrator Cabinet at Acme Drum Co., Chicago, Illinois, a commercial drum "laundry". Wheelabrating removes all of the paint and rust from interior and exterior surfaces at the rate of one drum every 9 to 12 seconds depending upon their condition, at substantial cost and time savings.

Copper Shot Now Available

Long awaited by the producers of brass and bronze castings, copper shot is now available for use in blast cleaning equipment. Brass and bronze castings Wheelabrated with copper shot have a more natural finish and a brighter appearance. Early tests indicate that cleaning costs can be materially reduced with this new abrasive.

Eliminating Acid Pickling

The use of Wheelabrating instead of pickling has shown many advantages, and is receiving widespread acceptance. It solves the waste pickle liquor disposal problem and eliminates the possibility of defects such as pitting, smut formation and hydrogen embrittlement. The matte surface produced insures an excellent bond for plating, galvanizing, enameling, and similar finishes.

The Wheelabrator Method of Airless Blast Cleaning

"Wheelabrating" is a simple mechanical method of abrasive blasting in which abrasive is fed through a control cage to the center of the bladed "Wheelabrator" wheel which rotates at high speed. By centrifugal force the abrasive is thrown from the wheel, under careful directional control, upon the product being cleaned or finished. For complete information write for Catalog 74-A.

American
WHEELABRATOR & EQUIPMENT CORP.
510 S. Byrkit St., Mishawaka 3, Indiana

Manufacturers of **WHEELABRATOR**®
Airless Abrasive Blast Equipment

troplate Cu and Pb. Adjust to pH 12 Complete as in (7).

(7e) In zinc alloys:

Dissolve in HNO_3. Filter Sn. Electroplate Cu and Pb. Precipitate Fe with NH_4OH. Separate Cd as sulfide. Complete with di-β-naphthylthiocarbazone as in (7).

CALCIUM

(8) In steels:

Dissolve in HCl and HNO_3. Filter off insoluble portion, fuse with carbonate and return to original solution. Precipitate all elements possible with H_2S. Filter. Evaporate and fume filtrate with HNO_3-$HClO_4$. Dilute. Add buffer solution and precipitate oxalate. Filter. Dissolve in dil H_2SO_4 and known volume of standard permanganate. Determine Ca by determining excess permanganate from calibration curve, at 530 mμ.

Interfering ions: Sr (not likely to be present).

References:

Scott, R. E. and Johnson, C. R.; Ind. Eng. Chem., Anal. Ed., 17,504 (1945)

CARBON

(9) In steels (color):

Dissolve in dil HNO_3. Compare color with standard steels.

CHROMIUM

(10) In steels:

Dissolve in HCl-HNO_3 and fume with $HClO_4$. (For very low alloy steels; add water, boil, dilute and determine Cr as $H_2Cr_2O_7$.) Cool to 50°F. Filter on glass crucible and wash with cold $HClO_4$. CrO_3 remains on filter. Dissolve residue in water. Determine Cr as $H_2Cr_2O_7$.

Interfering elements: None.

References:

Silverman, L.; Ind. Eng. Chem., Anal. Ed., 14,791 (1942).

Singer, L. and Chambers, W. A., Jr.; Ind. Eng. Chem., Anal. Ed., 16,507 (1944).

Smith, G. F.; "Mixed Perchloric, Sulfuric and Phosphoric Acids and Their Applications in Analysis," G. Frederick Smith Chemical Co., Columbus, Ohio.

(10a) In ferromanganese:

Proceed as in (10), and fume with $HClO_4$ to the first brown color. Dilute with H_2O. Add 0.2 g of NaCl and boil. Complete as in (10).

(10b) In ferromolybdenum:

Proceed as in (10), fume with $HClO_4$. Cool. Dilute with H_2O. Filter off any molybdic acid. Determine as in (10).

(10c) In ferrotitanium:

Fuse with Na_2O_2. Leach out chromate. Acidify with H_2SO_4. Complete as in (10).

(10d) In aluminum alloys:

Dissolve in mixture of H_3PO_4 and $HClO_4$. Complete as in (10a).

Interfering elements: High Cu (blue color).

Co-owners M. W. Hays (left) and Oliver S. Pendlay (right), discussing expansion plans with Sales Manager E. T. Brown.

A plating "Success Story"

In the Rapid Rise of the Cadmium & Nickel Plating Company from Obscurity to a Leading Position, There's an Idea for *Your* Business!

From a single hand-plater in a shed to one of the biggest job shops on the Pacific Coast in the space of 18 years—that's the story of the Cadmium & Nickel Plating Company, Los Angeles. It's a personal tribute to the energy, ability and vision of two men—M. W. Hays and O. S. Pendlay—and to the Udylite equipment around which they built their business.

RAPID GROWTH IN FIRST DECADE

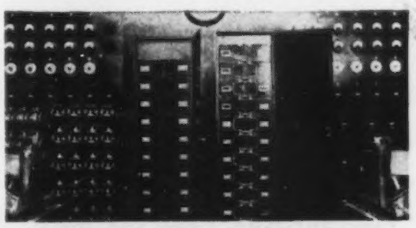
It didn't take Messrs. Hays and Pendlay long to see that the Coast offered plenty of business for the shop equipped to turn out plating work fast and well. They moved to bigger quarters the year after they started (1931), ordered new Udylite barrel-plating equipment, and began getting into *volume* work. Growth came rapidly. Bigger orders called for new Udylite Semi-Automatic machines . . . then Full Automatics. By the time they lit the candles on their 10th birthday cake, they were moving again to larger and more modern quarters . . . the fine 22,000 sq. ft. structure they occupy today.

Udylite Barrel Platers are used for quality finishing of all small parts.

UDYLITE EQUIPMENT "THE BACKBONE"

Tour their plant today and you'll see the finest in production plating operations. There's a complete Barrel Plating Division — two big Udylite Full Automatics that deliver up to 100 racks per hour—a versatile Udylite Semi-Automatic 1500 gal. Nickel Plating unit—and a battery of high-efficiency Udylite Rectoplaters. Efficient planning speeds the work directly from the raw stock department through the various cleaning and plating cycles and out for shipping.

Automatic control equipment with Udylite Rectoplaters provides maximum direct current efficiency.



Two Udylite Full Automatics are used for high-speed production plating.

Co-owners Hays and Pendlay give much of the credit for success to better plating methods, made possible by Udylite-engineered equipment. "It helped us cut costs—improve quality—develop fast output for prompt delivery—and gain a 'quality' reputation we're proud of. We look forward to even bigger things in the years ahead," the enterprising C&NP executives report.

PUT UDYLITE IN YOUR PLANS

There's food for thought here for other progress-minded plating executives. Let one of our technical men go over *your* plans with you, and show you how Udylite's high-efficiency equipment will improve your operations, methods and processes. There's no cost or obligation for this expert technical assistance that can point the way to better quality, faster output, more business and greater earnings and growth in your plant. We'd like to work with you, so drop us a line soon. Address: The Udylite Corporation, Detroit 11, Michigan.

Pioneer of A Better Way in Plating

Udylite

THE UDYLITE CORPORATION, DETROIT 11, MICHIGAN

References:

Silverman, L.; Ind. Eng. Chem., Anal. Ed., 10, 81 (1938).

(*10e*) ***In copper alloys*** (***Cupaloy***):

Dissolve in HNO_3, H_3PO_4 and $HClO_4$. Fume. Cool. Electroplate Cu. Oxidize Cr with $AgNo_3$ and $(NH_4)_2S_2O_8$. Determine Cr as $H_2Cr_2O_7$, as in (10).

References:

Silverman, L.; "Procedures for Cupaloy," unpublished.

COBALT

(*11*) ***In steels:***

Dissolve in HCl plus H_2O_2. Boil out peroxide. Adjust to pH 1.0 with HCl. Add ammonium acetate, tartaric acid and NH_4CNS. Solution is now pH 3.5 to 4. Extract blue color with amyl alcohol-ethyl ether mix. Determine Co as thiocyanate.

Interfering elements: None.

References:

Bayliss, N. S. and Pickering, R. W.; Ind. Eng.. Chem., Anal. Ed., 18,446 (1946).

Young, R. S. and Hall, A. J.; Ind. Eng. Chem., Anal. Ed., 18,264 (1946).

COPPER

(*12*) ***In steels:***

Dissolve in HCl plus H_2O_2. Boil out excess peroxide. Add citric acid, NH_4OH and dimethylglyoxime. Filter off any nickel. Use 0.1 g or less, aliquot. Add NH_4OH to pH 9 or slightly higher. Add sodium diethyldithiocarbamate and extract brown color with CCl_4. Determine Cu at 540 Mμ.

Interfering elements: None.

References:

Partridge, R. F.; Ind. Eng. Chem., Anal. Ed., 17,422 (1945).

(*12a*) ***In ferrotitanium:***

Fuse with Na_2CO_3. Leach with HCl and retain filtrate. Complete as in (12).

(*12b*) ***In ferrotungsten:***

Dissolve in HNO_3-HF. Fume with $HClO_4$. Dilute. Filter. Use filtrate and complete as in (12).

(*12c*) ***In high temperature alloys:***

Dissolve in aqua regia. Adjust to 2 ml HCl per 100 ml. Pass in H_2S. Filter. Dissolve in HNO_3-$HClO_4$. Dilute. Complete as in (12).

(*12d*) ***In lead base alloys:***

Dissolve in HNO_3 and citric acid. Add NH_4OH in excess (triethanolamine). Color is blue. Determine Cu.

Interfering elements: Ni, also blue. Fe gives yellowish tinge.

LEAD

(*13*) ***In steels:***

Dissolve in HCl and HNO_3. Boil out chlorine. Adjust to 2 ml HCl per 100 ml. Pass in H_2S until yellow color disappears. Add 50 mg $CuSO_4$. Filter sulfides. Fume precipitate with HNO_3 and $HClO_4$. Dilute. Reduce any H_2CrO_4 with one drop of H_2O_2. Add citric acid, NaOH

and NaCN to pH 11. Extract with dithizone. Remove excess dithizone by washing with ammonia-NaCN solution, pH 9.0 to 9.2. Determine Pb at 520 Mμ.

Interfering elements: None. Bi, if present is removed at pH 2.5.

References:

Bricker, L. G. and Proctor, K. L.; Ind. Eng. Chem., Anal. Ed., 17,511 (1945).

Silverman, L.; Anal. Chem., 20,906 (1948).

(13a) In cadmium alloys:

Dissolve in HNO_3 and HCl. Add 20 mg $FeCl_3$. Precipitate with NH_4OH. Fume precipitate with HNO_3 and $HClO_4$. Complete as in (13).

(13b) In copper alloys (low concentrations):

Dissolve in HNO_3. Filter Sn. Add citric acid, NaOH and NaCN. Complete as in (13).

Interfering elements: Ni (over 3 pct) and Fe (over 2 pct). None in 99.9 pct Cu.

(13c) In tin alloys (low concentrations):

Add ZnO, HCl, HBr and $HClO_4$. Volatilize As, Sb, Sn. Dilute. Add citric acid. Complete as in (13).

Interfering elements: Ni (over 3 pct) and Fe (over 2 pct).

References:

Silverman, L. and Vance, W. E.; Symposium, Analytical Soc. of Pittsburgh.

MAGNESIUM

(14) In steels:

Dissolve in HCl-HNO_3. Filter. Fuse residue with Na_2CO_3 and add to solution. Remove all elements except the Ca and Na groups. Sample may contain 0.1 to 1.1 mg Mg. Add $CaSO_4$, H_2SO_4, starch, titan yellow and NaOH. Determine Mg at 525 Mμ.

Interfering elements: None.

References:

Ludwig, E. E. and Johnson, C. R.; Ind. Eng. Chem., Anal. Ed., 14,895 (1942).

(14a) In aluminum alloys:

Disintegrate with NaOH. Dissolve residue in HCl. Pass in H_2S to separate interfering elements. Complete as in (14).

(14b) In aluminum alloys (optional):

Separate interfering elements as in (14a). Precipitate Mg as 8-hydroxyquinolate. Filter. Dissolve precipitate in acetic acid. Add $FeCl_3$. Determine Mg. at 650 Mμ.

References:

Gerber, L., Classen, R. I. and Boruff, C. S.; Ind. Eng. Chem., Anal. Ed., 14,658 (1942).

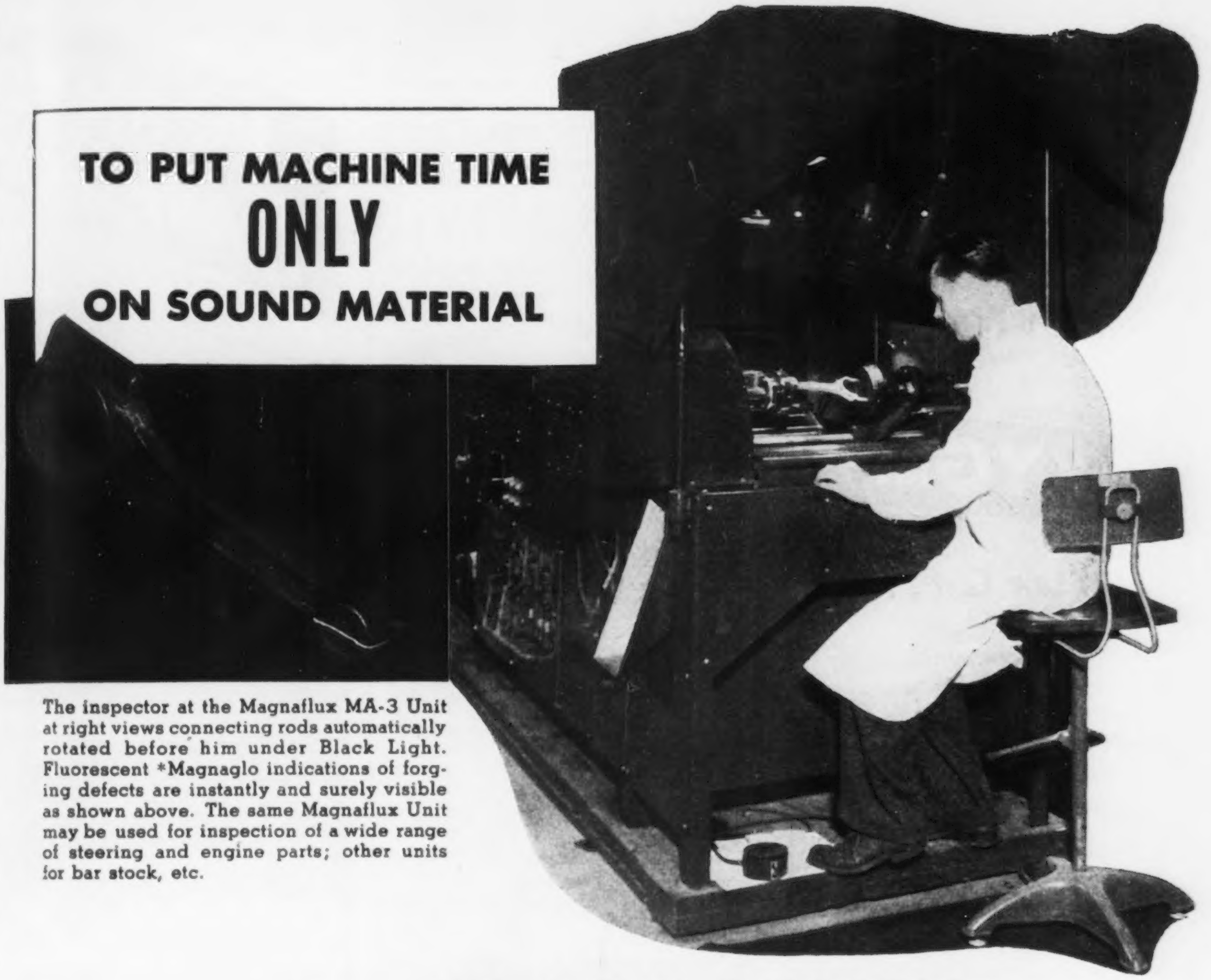
"Analytical Methods for Aluminum," Aluminum Research Institute, Chicago.

MANGANESE

(15) In steels:

Dissolve in mixture of HNO_3, H_2SO_4 and H_3PO_4. Add $(NH_4)_2S_2O_8$ and boil.

TO PUT MACHINE TIME ONLY ON SOUND MATERIAL



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Add KIO_4 and boil. Cool. Determine Mn as permanganate, using undeveloped sample as the blank. When Pb, Cu, Sb or Hg are present, substitute $(NH_4)_2S_2O_8$ plus $AgNO_3$ for KIO_4.

Interfering elements: None in low alloy steels. Not used when colored ions are present.

References:

Willard, H. H. and Greathouse; J. Amer. Chem. Soc., 39, 2366 (1917).

(15a) In ferrosilicons:

Dissolve in HNO_3 and HF. Fume with $HClO_4$. Add HNO_3-H_2SO_4-H_3PO_4 mixture. Complete as in (15).

(15b) In lead base alloys:

Proceed as in (15), disregarding precipitate of $PbSO_4$. Use the persulfate oxidation.

MOLYBDENUM

(16) In steels:

Dissolve in HCl-HNO_3 and fume with $HClO_4$. Dilute and cool to 59°F. Add H_2SO_4, NaCNS and $SnCl_2$. Solution must be extracted with isopropyl ether when colored elements are present. Determine Mo as red thiocyanate.

Interfering elements: If W is present, use tartaric acid.

References:

Cunningham and Hammer; Ind. Eng. Chem., Anal. Ed., 3,106 (1931).

Hurd and Allen; Ind. Eng. Chem., Anal Ed., 7,396 (1935).

Silverman, L.; Metal Finishing, Oct. 1946.

(16a) In ferrotitanium:

Dissolve in HNO_3-HF. Fume with $HClO_4$. Dilute. Dissolve with NH_4OH and tartaric acids. Acidify. Complete as in (16).

NICKEL

(17) In steels:

Dissolve with HCl-HNO_3. Boil out chlorine. Add tartaric acid (not citric acid), bromine water, NH_4OH and dimethylglyoxime reagent. After 1 min, add NaOH to stabilize red color. Determine Ni at 530 Mμ.

Interfering elements: None.

References:

Makepeace, G. R. and Craft, C. H.; Ind. Eng. Chem., Anal. Ed., 16,375 (1944).

Mitchell, A. M. with Mellon, M. G.; Ind. Eng. Chem., Anal. Ed., 17,380 (1945).

Murray, W. M. and Ashley, S. E. Q.; Ind. Eng. Chem., Anal. Ed., 10, 1 (1938).

(17a) In alloy steels:

Colored ions present. Dissolve with HCl-HNO_3. Boil out chlorine. Add tartaric acid and make ammoniacal. Add dimethylglyoxime. Let stand. Extract Ni with $CHCl_3$. Discard water layer. Wash $CHCl_3$ with acid wash. Discard $CHCl_3$. Complete as in (17) with tartaric acid, bromine water, NH_4OH, dimethylglyoxime and NaOH. Determine Ni at 530 Mμ.

NI-RESIST* CASTINGS AVAILABLE IN ALL IMPORTANT INDUSTRIAL AREAS

Your Complimentary Copy of "Engineering Properties and Applications of Ni-Resist" is Ready at the Nearest Authorized Ni-Resist Foundry Listed Below . . . Write for it Now.

Ni-Resist provides a unique combination of engineering properties: resistance to corrosion, heat and wear; strength and toughness, good machinability; high electrical resistance and by suitable choice of nickel content, non-magnetic characteristics and high and low thermal expansion. A few typical instances of the numerous successful applications are shown below:

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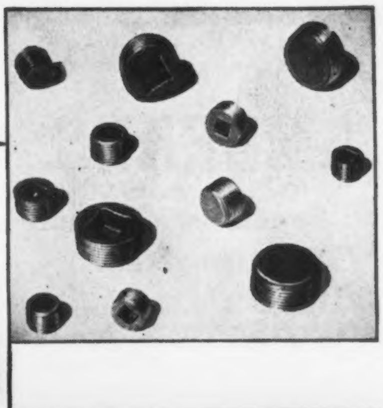
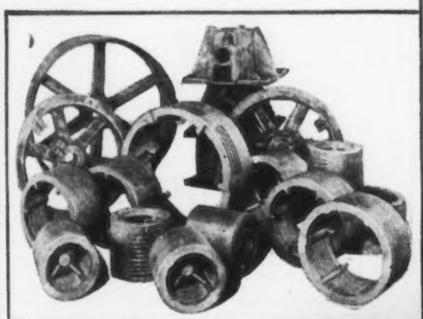
American Brake Shoe Co., New York 17, N. Y.
American Brake Shoe Co., Electro-Alloys Division, Elyria, Ohio
American Brake Shoe Co., Engineered Castings Division, Rochester, N. Y.
American Cast Iron Pipe Co., Birmingham 2, Ala.
American Chain & Cable Co., Inc., Reading Steel Casting Division, Reading, Pa.
Baker Perkins, Inc., Saginaw, Mich.
The Baldwin Locomotive Works, Eddystone Division, Philadelphia 36, Pa.
Barnett Foundry & Machine Co., Irvington, N. J.
Campbell, Wyant and Cannon Foundry Co., Muskegon, Mich.
Carondelet Foundry Co., St. Louis 10, Mo.
Dameron Metal Sales Co., Compton, Calif.
De Zurik Shower Co., Sartell, Minn.
Duluth Brass Works Co., Duluth, Minn.
The Duriron Co., Inc., Dayton 1, Ohio
Eagle Brass Foundry Co., Seattle 4, Wash.
Elizabeth Street Foundry Co., Chicago 36, Illinois
Frank Foundries Corp., Moline, Illinois
General Metals Corp., Oakland 3, Calif.
Hunt-Spiller Manufacturing Corp., Boston 27, Mass.
Janney Cylinder Co., Philadelphia 36, Pa.
Kingsport Foundry & Mfg. Corp., Kingsport, Tenn.
Koppers Company, Inc., Piston Ring Division, Baltimore 3, Md.
Kutztown Foundry & Machine Corp., Kutztown, Pa.
Lincoln Foundry Corp., Los Angeles 11, Cal.
Link Belt Co., Olney Foundry Division, Philadelphia, Pa.
Madsen Iron Works, Huntington Park, Calif.
Michiana Products Corp., Michigan City, Ind.
Michigan Steel Casting Co., Detroit 7, Mich.
Montague Machine Co., Turners Falls, Mass.
National Iron Works, San Diego 12, Calif.
Pacific Foundry Co., Ltd., San Francisco, Cal.
Peru Foundry Co., Peru, Ind.
The Pusey & Jones Corp., Wilmington 99, Del.
Reda Pump Co., Bartlesville, Okla.
The Richmond Foundry & Mfg. Co., Inc., Richmond, Va.
Ross-Meehan Foundries, Chattanooga 1, Tenn.
Shenango-Penn Mold Co., Dover, Ohio
Standard Brass & Mfg. Co., Port Arthur, Tex.
Stanley Foundries, Huntington Park, Calif.
The Sterling Foundry Co., Wellington, Ohio
Straight Line Foundry & Machine Corp., Syracuse, N. Y.
The Taylor & Fenn Co., Hartford 1, Conn.
Texaloy Foundry Co., San Antonio 3, Texas
Thomas Foundries, Inc., Birmingham 1, Ala.
Trinity Valley Iron & Steel Co., Fort Worth, Texas
The W. S. Tyler Co., Cleveland 14, Ohio
United States Pipe and Foundry Co., Burlington, N. J.
Utility Steel Foundry, Vernon (L.A.), Calif.
Westlectric Castings, Inc., E. Los Angeles 22, Calif.
The Youngstown Foundry and Machine Co., Youngstown 1, Ohio

SMALL CASTINGS: Pipe plugs cast in Ni-Resist to defeat corrosion . . . prevent sticking. An example of small size Ni-Resist castings adapted to quantity production by jobbing foundries. →





MEDIUM CASTINGS: Free from tendencies to corrode, comminutor parts cast in Ni-Resist lengthen life of sewage disposal equipment.

LARGE CASTINGS: Filter wheel weighing several tons cast in Ni-Resist prevents contamination of first quality caustic and resists thermal shock.

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NEW YORK 5, N. Y.

(17b) In cobalt alloys:

Precipitate Ni with dimethylglyoxime in presence of potassium ferricyanide. Complete as in (17a).

References:

Silverman, L. and Lembersky, H. K.; Anal. Chem., future publication.

(17c) In lead base alloys:

Proceed as in (17), but filter off precipitate of $PbCl_2$.

(17d) In silver alloys:

Dissolve in HNO_3. Separate Ag as insoluble chloride. Add tartaric acid, etc. Complete as in (17).

NITROGEN

(18) In steels:

Dissolve in HCl. Filter residue and fume with pyrosulfate-H_2SO_4. Combine solutions. Add NaOH. Distill ammonia into water. Determine with Nessler's Reagent.

Interfering elements: Results may be low.

References:

Silverman, L.; THE IRON AGE, Feb. 6, 1947.

PHOSPHORUS

(19) In steels:

Dissolve in HCl-HNO_3 and fume with $HClO_4$. Dilute. Boil. Add Na_2SO_3. Add ammonium molybdate-hydrazine sulfate-sodium sulfite reagent. Heat. Cool. Use undeveloped sample as blank. Determine blue P color at 820 Mμ. Optional procedure, (19b).

Interfering elements: As, V, W. Filter Cb, Ta. Add HBr for As.

References:

Hague, J. L. and Bright, H. A.; J Research, Nat. Bur. Stand., 26,405 (1941).

(19a) In ferrotitanium:

Fuse alloy with Na_2CO_3. Leach with H_2O. Complete as in (19).

(19b) In nickel alloys:

Dissolve in HCl-HNO_3. Fume with $HClO_4$. Dilute. Add sodium vanadate, then Na_2MoO_4 solutions. Use undeveloped sample as blank. Determine yellow P color at 465 Mμ.

Interfering elements: High V and high W.

References:

Hill, U. T.; Ind. Eng. Chem., Anal Ed., 19,318 (1947).

SELENIUM

(20) In steels:

Dissolve with $CuCl_2$-KCl reagent. Filter off Se. Dissolve with ZnO-HNO_3-H_2SO_4 mix. Fume. Cool. Dilute. Reduce with KI, hydroxylamine hydrochloride and use gum arabic. Determine the red Se color.

Interfering elements: Te.

References:

Silverman, L.; Ind. Eng. Chem., Anal. Ed., 8,132 (1936).

SILICON

(21) In steels (up to 0.9 pct Si only):

Dissolve in HNO_3 and HCl (measured). Dilute to volume. Treat aliquot with $(NH_4)_2MoO_4$ solution and wait for yellow color development. Add NaF. Determine Si at 420 Mμ. Use undeveloped sample as blank.

Interfering elements: None. Some interference from highly alloyed steels with over 2 pct P.

References:

Rozental, D. and Campbell, H. C.; Ind. Eng., Chem., Anal. Ed., 17,222 (1945).

(21a) In ferrotitanium:

Fuse alloy with Na_2CO_3. Leach with H_2O. Complete as in (21).

(21b) In aluminum alloys:

Dissolve in NaOH in metal dish. Add H_2O_2. Add thymol blue. Add HCl until indicator is yellow, then pink. Add HCl and acetic acids, either Na_2MoO_4 or $(NH_4)_2MoO_4$ solution, then NA_2SO_3. Complete as in (21).

References:

Brabson, J. A., Harvey, I. W., Maxwell, G. E. and Schaeffer, O. A.; Ind. Eng. Chem., Anal. Ed., 16,705 (1944).

(21c) In lead base alloys:

Proceed as in (21), but decant off $PbCl_2$.

(21d) In magnesium alloys:

Dissolve in H_2SO_4-boric acid mix. Add ammonium persulfate. Filter. Fuse residue with Na_2CO_3. Combine with filtrate. Add molybdate reagent. Complete as in (21).

TIN

(22) In steels:

Dissolve in Claissen flask with HCl and H_2SO_4. Evaporate to fumes or to near solidification. Add H_2SO_4, HCl and KBr to flask. Distill into Erlenmeyer flask. Add zinc shot and boil. Add Na_2SiO_3-$(NH_4)_2MoO_4$ reagent (prepared daily) and mix to develop blue color. Decant into glass-stoppered flask. Determine Sn.

Interfering elements: As (5 mg, maximum permissible), Sb (3 mg, maximum permissible).

References:

Baker, I., Miller, M. and Gibbs, R. S.; Ind. Eng. Chem., Anal. Ed., 16,269 (1944).

(22a) In lead base alloys (up to 0.5 pct Sn only):

Dissolve in HNO_3(1:4). Filter off SnO_2 on asbestos pad. Dissolve Sn with HCl and zinc shot. Complete as in (22).

(22b) In magnesium alloys:

Dissolve in HNO_3. Precipitate Sn with excess NH_4OH. Dissolve Sn off paper with HCl and zinc shot. Complete as in (22).

TITANIUM

(23) In steels:

In absence of V, dissolve in HCl plus H_2O_2. Fume with $HClO_4$. Dilute. Cool to 50°F. Add H_2O_2. Determine Ti at 480 Mμ, using undeveloped sample as blank.

(23a) In steels:

In presence of V, dissolve in HCl and HNO_3. Add H_2SO_4 and evaporate to fumes. Dilute. Add NH_4CNS and p-hydroxyphenylarsonic acid. Boil. Filter off Ti. Dissolve in HNO_3-$HClO_4$ mixture. Fume. Dilute. Cool. Add H_2O_2. Determine Ti at 400 to 480 Mμ.

Interfering elements: None.

References:

Simpson, C. T. and Chandleer, G. C.; Ind. Eng. Chem., Anal. Ed., 10,642 (1938).

Silverman, L.; Chem.-Anal., 37, 3, 62 (1948).

(23b) In ferromolybdenum:

Dissolve in dil HNO_3. Separate bulk of Mo by NH_4OH. Dissolve precipitate in HNO_3 and $HClO_4$. Fume. Dilute. Complete as in (23), or as in (23a) if V is present.

(23c) In ferrotungsten:

Dissolve in HNO_3-HF. Fume with $HClO_4$. Dilute. Add NH_4OH and complete as in (23b).

TUNGSTEN

(24) In steels:

Dissolve in HCl-HNO_3, add H_2SO_4 and evaporate to heavy fumes. Dissolve in H_2O. Aliquot. Reduce with $SnCl_2$ and hydroquinone to produce red color. Determine W at 550 Mμ.

Interfering elements: Ti. Cb. Less than 0.1 pct W not detected in highly alloyed steels.

References:

Johnson, C. M.; The Iron Age, 157, 14 (Apr. 14, 1946).

VANADIUM

(25) In steels:

Dissolve in HNO_3-HCl. Fume with $HClO_4$. Dilute. Cool. Add H_2O_2 and HF. Use undeveloped sample as blank. Determine V, as yellow peroxide, at 400 to 500 Mμ.

Interfering elements: None.

(25a) In alloy (tungsten) steels:

Dissolve in aqua regia. Fume with $HClO_4$. Do not add water. Cool to 50°F. Filter on Gooch crucible. Reserve filtrate. Dissolve cold H_2CrO_4 in H_2O. Repeat $HClO_4$ fuming and filtering. Combine filtrates. Evaporate to small volume. Dilute. Cool. Add H_2O_2. Complete as in (25).

Interfering elements: None. Results may be 0.02 pct low when W is above 10 pct.

References:

Silverman, L.; Ind. Eng. Chem., Anal. Ed., 14,791 (1942).

(25b) In ferrotitanium:

Fuse with Na_2CO_3. Leach with H_2O.

FEATURE CONTINUATION

Acidify with $HClO_4$. Complete as in (25).

(25c) In copper alloys:

Proceed as in (25), but electroplate Cu.

ZINC

(26) In steels:

Dissolve with HCl-HNO_3. Fume with $HClO_4$. Add solid NaCl to volatilize Cr. Add NaBr to volatilize Sn. Dilute. Add NH_4OH until a precipitate just forms. Add citric acid. Neutralize to methyl red. Add formic acid buffer solution. Pass in H_2S. If a black precipitate does not appear, add 1 mg $CuSO_4$. Filter off precipitate. Dissolve in HNO_3-$HClO_4$. Fume. Dilute. Adjust to pH with NH_4OH. Extract Cu, Zn, Pb with dithizone. Recover Zn, Pb from chloroform by acid-water wash. Add NH_4OH, $Na_2S_2O_3 \cdot 5H_2O$ and buffer (pH 4.3) to aqueous solution. Extract Zn with dithizone, leaving Pb in aqueous solution. Wash chloroform solution (Zn) with Na_2S. Determine Zn at 560 Mμ.

Interfering elements: Cd and high Bi.

References:

Bricker, L. G., Weinberg, S. and Proctor, K. L.; Ind. Eng. Chem., Anal. Ed., 17,661 (1945).

Sandell, E. B.; Ind. Eng. Chem., Anal. Ed., 9,464 (1937).

(26a) In cadmium alloys:

Dissolve in HNO_3 and HCl. Nearly neutralize with NaOH. Pour solution into 5 pct NaOH solution. Reserve filtrate. Dissolve cadmium precipitate in HCl. Reprecipitate as before. Combine filtrates. Adjust to pH 0.8 with H_2SO_4. Pass in H_2S to precipitate Cd, Cu, Pb. Fume precipitate with HNO_3 and $HClO_4$. Drop in NaBr to volatilize Sn. Complete as in (26).

(26b) In copper alloys (low concentrations):

Dissolve in HNO_3. Filter Sn. Electroplate Cu and Pb. Separate from Cd and Fe as in (26a). Use NH_4OH, $Na_2S_2O_3$, etc., to determine Zn, as in (26).

(26c) In lead base alloys:

Dissolve in HNO_3 (1:4). Add H_2SO_4. Filter off most of Pb. Adjust to 2 ml HCl per 100 ml. Pass in H_2S. Filter Cu, Pb, Sn, Cd. Adjust with citric acid and formic acid buffer. Precipitate ZnS. Dissolve precipitate in HNO_3 and $HClO_4$. Complete as in (26).

(26d) In magnesium alloys:

Proceed as in (26), but do not add salt to volatilize Cr.

(26e) In silver alloys:

Dissolve in HNO_3. Filter Sn. Separate Ag as insoluble chloride. Extract Cu, Pb, Cd as in (26), and complete.

(26f) In tin alloys:

Add HCl, HBr and $HClO_4$. Add Br. Volatilize most of As, Sb, Sn. Filter insolubles. Electroplate Cu, Pb, (Bi). Complete for Zn, as in (26).

◆—FEATURE CONTINUATION—◆

ZIRCONIUM

(27) In steels:

Dissolve in HCl and HNO_3. Add H_2SO_4 and evaporate to fumes. Dilute. Add NH_4CNS and p-hydroxyphenylarsonic acid. Boil. Filter off Zr. Dissolve in HNO_3-$HClO_4$ mixture. Fume. Dilute. Add sodium alizarin sulfonate. Adjust to pH 1.1. Determine Zr, at 520 Mμ.

Interfering elements: None.

References:

Green, D. E.; Anal. Chem., 20,370 (1948).

Simpson, C. T., and Chandlee, G. C.: Ind. Eng. Chem., Anal. Ed., 10,642 (1938).

(27a) In aluminum alloys:

Disintegrate with NaOH. Fuse residue with $K_2S_2O_7$. Aliquot and use one part as blank. Add sodium alizarin sulfonate. Adjust pH. Complete as in (27).

IRON

(28) In high temperature alloys:

Dissolve in HCl and H_2O_2. Fume with $HClO_4$. Volatilize most of H_2CrO_4 with NaCl. Dilute. Aliquot. Reduce Fe with hydroxylamine hydrochloride and develop color with o-phenanthroline at pH 3. Treat blank in same manner, except for o-phenanthroline. Determine Fe at 508 Mμ.

Interfering elements: Ni, Co are compensated for, Cu precipitates and is filtered.

References:

Mehlig, V. P. and Hulett, H. R.; Ind. Eng. Chem., Anal. Ed., 14,869 (1942).

(28a) In copper and nickel alloys:

Dissolve and volatilize Cr as in (28). Use alkaline buffer and 1,2-dihydroxybenzene-3,5-disulfonate, sodium salt. Determine Fe at 500 Mμ.

Interfering elements: Co.

References:

Greenburg, R. H.; Ind. Eng. Chem., Anal. Ed., 18,255 (1946).

(28b) In cobalt alloys:

Fe must be separated from Co by NH_4OH or hexamethylene tetramine. Complete as in (28) or (28a).

(28c) In aluminum alloys:

Proceed as in (28), except that Cr is not volatilized. Determine Fe at pH 3.

(28d) In copper alloys:

Dissolve in HNO_3. Electroplate Cu and Pb. Adjust pH and complete as in (28). See also (30). In manganese bronze, recover Fe as in (5c) by volatilization.

(28e) In lead base alloys:

Dissolve in HNO_3 (1:4). Filter. Reserve filtrate. Wash precipitate with $(NH_4)_2S$, leaving Fe, Cu on paper. Dissolve precipitate with HCl. Combine with reserved portion. Complete with hydroxylamine hydrochloride, as in (28).

(Continued on page 169)

Secretary Johnson Orders JANMAT to Wind Up Affairs

Deadline Set for June 30 After Which Munitions Board Takes Policy

• • • **Abolition of the** Joint Army-Navy Machine Tool committee, along with 20 other boards and committees, was ordered last week by Defense Secretary Louis Johnson in a drive to eliminate useless, inactive or overlapping groups within the military establishment.

A review of 56 boards and committees has been made and a previous order had already sounded the death knell to nine. A total of 30 have now been abolished and hearings are under way concerning the fate of six others.

In the case of JANMAT, the committee has been ordered to wind up its affairs by June 30, at which time its policy functions will be turned over to the Munitions Board and its remaining work to the Navy.

It is not anticipated that much actual work will remain on that date. This depends on how well War Assets Administration (also scheduled to die June 30) has cleared its books. An undetermined amount of equipment has not yet been released by WAA for screening by JANMAT.

Created to salvage from war surpluses such machine tools and capital equipment as might be needed for industrial mobilization, JANMAT has tagged as reserve set-asides some 124,000 items, according to testimony at the congressional military appropriation hearings in January.

However, this figure made no allowances for tools which had later been discarded as obsolete or released to industry for use under reserve conditions.

As of Mar. 31, JANMAT told THE IRON AGE, the "effective" number tagged stood at more than 108,000 of which about 103,000 have been transferred or are in the process of shipment.

In Detroit, there were no significant machine tool developments this week. A report that Cadillac will have a new transmission in the fall has been confirmed but indications are that a substantial amount of new tooling will not be required. There are no new developments regarding a reported new Dodge engine. A proposed new stamping plant for Ford or an automatic transmission by Detroit Gear Div. of Borg-Warner has been reported.

Some buying of maintenance equipment by the Detroit transmission division has occurred but the status of the new transmission plant remains hazy. One theory advanced here is that the new plant may be used initially to produce hydramatic units for Mercury and Lincoln.

Recent indications that a tooling program at Detroit tank arsenal was in the making have not materialized.

Tool and die shops in the Detroit area are rapidly running out of work and activity here is currently at a very low level and without prospects for improvement. Current reports that extensive changes in the new Chrysler models are in the offing have not been confirmed by Detroit tool and die shops.

In Cleveland, the monthly report of National Machine Tool Builders' Assn. showed an increase in machine tool shipments and orders in March. NMTBA's March index of new orders was 93.1 as compared with 80.9 for February. Index of foreign orders, which are included in the total, were 22.3 as compared with 26.5 for February.

Index of shipments was 75.3 as compared with 70.3 for February. Ratio of unfilled orders to shipments was 4.4 to 1 as compared with 4.7 to 1 the preceding month.

A development of considerable interest in Cleveland this week was the formal opening of the used machinery division of Motch & Merryweather Machinery Co., which is housed in a new and ultra modern plant at 1350 E. 222nd St., Euclid, Ohio.

In Sidney, Ohio, Monarch Machine Tool Co. reported increased earnings in the quarter ended Mar. 31 to $117,731 on sales of $1,841,848 as compared with earnings of $107,147 on sales of $1,665,955 in the corresponding quarter of 1948. Jerome A. Raterman, president of Monarch said the increase in foreign and domestic order volume has been so marked in recent weeks that "our backlog is now $2,488,000 or twice what it was a year ago."

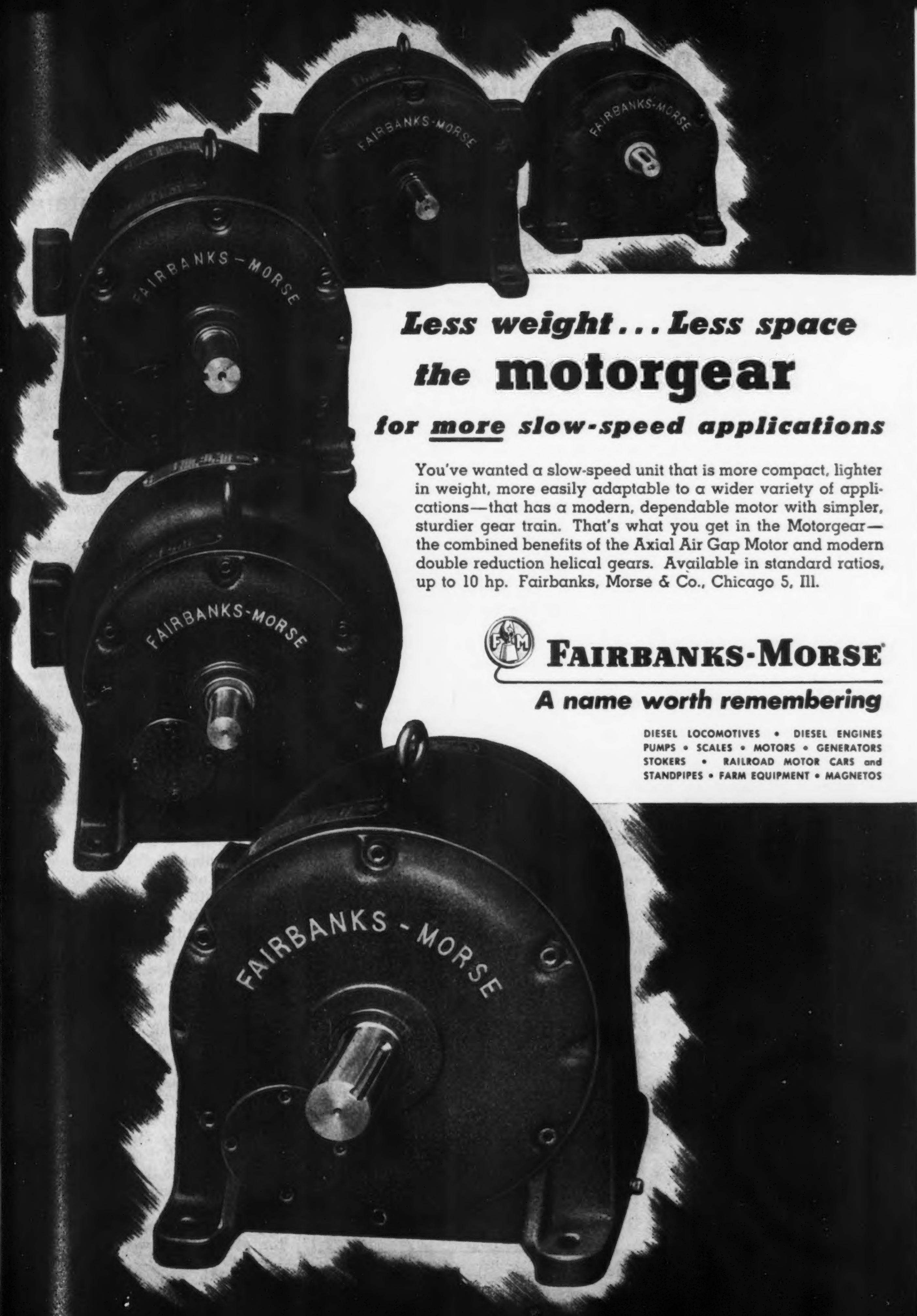
In Buffalo, representatives of more than 100 machine tool manufacturers attended the Machine Tool Electrification Forum sponsored by Westinghouse Electric Corp., Apr. 26 and 27. Tell Berna, general manager of National Machine Tool Builders' Assn., spoke on "Profits and Progress" at a dinner climaxing the 2-day session.

In Frankfurt, Germany, the United Press reported this week that Western Germany will send nearly $19 million worth of machinery, machine tools to Yugoslavia this year under a new trade agreement. The pact is the largest in effect between Western Germany and an iron curtain nation, involving more than $34 million worth of goods. More than half Western German's exports to Yugoslavia will be Diesel engines, spare parts for steelmaking equipment and machine tools and metal equipment.

Sales and Earnings Up

Dallas

• • • **Texas Engineering** and Mfg. Co. had net earnings of $871,252 for the year 1948 on sales of $10,088,951, according to its annual report which was released to stockholders.



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You've wanted a slow-speed unit that is more compact, lighter in weight, more easily adaptable to a wider variety of applications—that has a modern, dependable motor with simpler, sturdier gear train. That's what you get in the Motorgear—the combined benefits of the Axial Air Gap Motor and modern double reduction helical gears. Available in standard ratios, up to 10 hp. Fairbanks, Morse & Co., Chicago 5, Ill.
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STANDPIPES • FARM EQUIPMENT • MAGNETOS

Repeated Price Reductions Cause Most Consumers to Hesitate

New York

• • • **Repeated price** reductions in the nonferrous metals in the past few weeks have hammered consumers into a position where they are afraid to place orders. In some instances there is even a reluctance to publish new price lists for products in the fear that raw materials prices may not last longer than a week.

On Thursday custom smelters dropped the price of copper to 20.00¢ delivered Valley, on Friday, Scoville Mfg. Co. announced a revision of its mill products prices to a 20.00¢ copper basis. On Monday this price schedule was met by other leading brass mills. Brass mill scrap buying prices were also revised downward, but this means very little as mills are buying scrap only from their own customers.

Following the reduction of brass and bronze ingot prices by a Philadelphia ingot maker last week, other ingot producers reduced their published ingot prices by an average of 1½¢ on Monday. There was no business to speak of. Prices of aluminum ingots remained unchanged, except for minor revisions in some grades. The market continues inactive.

Prices of scrap metals were reduced again. Refineries dropped their copper buying prices by 2¢ per lb. Ingot makers reduced their brass buying prices by about 1¢ per lb. Dealers' buying prices were reduced by corresponding amounts. Ingot makers' buying prices for aluminum were reduced 1¢ per lb. Weakness also appeared in nickel and Monel scrap which dropped by 2¢ per lb.

Henry Kaiser Supports Alcoa In Defense of Justice Department Suit

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In Canada, Noranda Mines, Ltd. announced a copper price cut of 1½¢ per lb, bringing down the price to 21.50¢. Most Canadian copper producers are reported to have sold a large part of their production up to the first quarter of 1953 to the U. S. stockpile. The price schedule for Canadian copper has not been disclosed. Consolidated Mining and Smelting Co. of Canada has announced a 1¢ reduction in the price of zinc, bringing Prime Western to 13¢ per lb.

Early this week domestic primary producers of copper had not reduced from the 23.50¢ level. There was no indication that any copper producer was contemplating any early reduction, particularly in view of the fact that there was no buying going on. The brass mills are all out of the market. Wire mills are handicapped by the general trend in utilities to hold up all major construction programs pending a stabilization of the metal markets. It is learned that refineries are laying off workers.

In the perennial suit of the Dept. of Justice against the Aluminum Co. of America, Henry J. Kaiser testified in Federal Court last week for Alcoa. Mr. Kaiser reported that Permanente Metals Corp. made a net profit of 16.2 pct on sales, compared with 9.5 pct for Alcoa and 6.1 pct for Reynolds Metals Co. He said that there was no fear that Permanente would not be able to compete with Alcoa.

When asked whether Alcoa controlled or dominated Permanente, Kaiser laughed and said "No." The Government has charged that in order to obtain financing last year Permanente floated a loan of $8 million with the assistance of the First Boston Corp., which it says has ties with Alcoa.

It also alleged that to obtain this financing Permanente made patent license agreements with Alcoa which gave Alcoa competitive advantages and signed a 17-year contract with Alcoa for supplies of bauxite.

Mr. Kaiser, however, said he felt that patent deals were "very reasonable" and the bauxite contract was "highly advantageous and fair." As for the financing, he said his company originally had made arrangements with Dean Witter & Co., a San Francisco brokerage house, for a $4 million loan, but when additional capital was required the West Coast firm obtained the assistance of the First Boston Corp.

He denied that Permanente or anyone connected with him had agreed with Alcoa to limit competition or that he had discussed the financing with Alcoa officials or with Richard K. Mellon or his sister, Sarah Mellon Scaife, who own large blocks of non-voting stock in the First Boston Corp.

The industrialist said that Permanente's competitive position would be improved "materially" if the War Assets Administration accepted its offer to buy for $33,236,000 four plants it now operates under lease. He added that he felt Leonard J. Emmerglick, special assistant to the Attorney General, was trying to belittle the offer when he questioned Jess Larson, War Assets Administrator, about it last week.

Nonferrous Metals Prices

	Apr. 20	Apr. 21	Apr. 22	Apr. 23	Apr. 25	Apr. 26
Copper, electro, Conn.	21.50–23.50	20.00–23.50	20.00–23.50	20.00–23.50	20.00–23.50	20.00–23.50
Copper, Lake, Conn.	23.625	23.625	23.625	23.625	23.625	23.625
Tin, Straits, New York	$1.03	$1.03	$1.03	$1.03	$1.03	$1.03
Zinc, East St. Louis	13.00	13.00	13.00	13.00	13.00	13.00
Lead, St. Louis	14.80	14.80	14.80	14.80	14.80	14.80

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, 10,000 lb, freight allowed	17.00
Aluminum pig	16.00
Antimony, American, Laredo, Tex.	38.50
Beryllium copper, 3.75-4.25% Be dollars per lb contained Be	$24.50
Beryllium aluminum 5% Be, dollars per lb contained Be	$52.00
Bismuth, ton lots	$2.00
Cadmium, del'd	$2.00
Cobalt, 97-99% (per lb)	$1.80 to $1.87
Copper, electro, Conn. Valley	20.00 to 23.50
Copper, lake, Conn. Valley	23.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$100 to $110
Lead, St. Louis	14.80
Lead, New York	15.00
Magnesium, 99.8+%, f.o.b. Freeport, Tex.	20.50
Magnesium, sticks, carlots	34.50
Mercury, dollars per 76-lb flask, f.o.b. New York	$87 to $90
Nickel, electro, f.o.b. New York	42.93
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$72 to $75
Silver, New York, cents per oz.	71.50
Tin, Grade A, New York	$1.03
Zinc, East St. Louis	13.00
Zinc, New York	13.70
Zirconium copper, 10-12 pct Zr, per lb contained Zr	$12.00

Remelted Metals

Brass Ingot

(Published prices, cents per lb delivered, carloads)

85-5-5-5 ingot		
No. 115	15.25*	17.00
No. 120	14.75*	16.50
No. 123	14.25*	16.00
80-10-10 ingot		
No. 305	....	21.75
No. 315	....	18.75
88-10-2 ingot		
No. 210	....	28.50
No. 215	....	25.50
No. 245	18.00*	20.25
Yellow ingot		
No. 405	13.00*	14.50
Manganese bronze		
No. 421	....	19.50

* F.o.b. Philadelphia.

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys	
0.30 copper, max.	21.00-21.50
0.60 copper, max.	20.50-21.00
Piston alloys (No. 122 type)	18.00-18.50
No. 12 alum. (No. 2 grade)	17.00-17.50
108 alloy	17.25-17.75
195 alloy	18.50-19.00
13 alloy	20.50-21.00
AXS-679	18.00-18.50

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—95 pct-95½ pct	18.25-18.50
Grade 2—92 pct-95 pct	17.25-17.50
Grade 3—90 pct-92 pct	16.25-16.50
Grade 4—85 pct-90 pct	15.50-16.00

Electroplating Supplies

Anodes

(Cents per lb, freight allowed, in 500 lb lots)

Copper	
Cast, oval, 15 in. or longer	38.64
Electrodeposited	34⅝
Rolled, oval, straight, delivered	37.34
Ball anodes	38⅝
Brass, 80-20	
Cast, oval, 15 in. or longer	35⅞
Zinc, oval, 99.99	
Ball anodes	24.00
Nickel 99 pct plus	
Cast	59.00
Rolled, depolarized	60.00
Cadmium	$2.15
Silver 999 fine, rolled, 100 oz. lots, per troy oz, f.o.b. Bridgeport, Conn.	79

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	48.00
Copper sulfate, 99.5 crystals, bbls.	9.10
Nickel salts, single or double, 4-100 lb bags, frt. allowed	18.00
Nickel chloride, 300 lb bbl.	24.50
Silver cyanide, 100 oz. lots, per oz.	59
Sodium cyanide, 96 pct domestic 200 lb drums	19.25
Zinc sulfate, crystals, 22.5 pct, bags	
Zinc sulfate, 25 pct, granules, bbls, frt allowed	

Mill Products

Aluminum

(Base prices, cents per pound, base 30,000 lb, f.o.b. shipping point, freight allowed)

Flat Sheet: 0.188 in., 2S, 3S, 26.9¢; 4S, 61S-O, 28.8¢; 52S, 30.9¢; 24S-O, 24S-OAL, 29.8¢; 75S-O, 75S-OAL, 36.3¢; 0.081 in., 2S, 3S, 27.9¢; 4S, 61S-O, 30.2¢; 52S, 32.3¢; 24S-O, 24S-OAL, 30.9¢; 75S-O, 75S-OAL, 38¢; 0.032 in., 2S, 3S, 29.5¢; 4S, 61S-O, 33.5¢; 52S, 36.2¢; 24S-O, 24S-OAL, 37.9¢; 75S-O, 75S-OAL, 47.6¢.

Plate: ¼ in. and heavier: 2S, 3S, F, 23.8¢; 4S-F, 26¢; 52S-F, 27.1¢; 61S-O, 26.6¢; 24S-F, 24S-FAL, 27.1¢; 75S-F, 75S-FAL, 33.9¢.

Extruded Solid Shapes: Shape factors 1 to 4, 35.1¢ to 66¢; 11 to 13, 36.1¢ to 78¢; 23 to 25, 38.2¢ to $1.07; 35 to 37, 45.7¢ to $1.65; 47 to 49, 67.5¢ to $2.41.

Rod, Rolled: 1.064 to 4.5 in., 2S-F, 3S-F, 34¢ to 30.5¢; Cold-finished, 0.375 to 3.5 in., 2S, 3S, 36.5¢ to 32¢.

Screw Machine Stock: Drawn, ⅛ to 11/32 in., 11S-T3, R317-T4, 49¢ to 38¢; cold-finished, ⅜ to 1½ in., 11S-T3, 37.5¢ to 35.5¢; ⅝ to 2 in., R317-T4, 37.5¢ to 34.5¢; rolled, 1 9/16 to 3 in., 11S-T3, 35.5¢ to 32.5¢; 2⅛ to 3⅜ in., R317-T4, 33.5¢ to 32.5¢. Base 5000 lb.

Drawn Wire: Coiled, 0.051 to 0.374 in.: 2S, 36¢ to 26.5¢; 52S, 44¢ to 32¢; 56S, 47¢ to 38.5¢; 17S-T4, 50¢ to 34.5¢; 61S-T4, 44.5¢ to 34¢; 75S-T6, 76¢ to 55¢.

Magnesium

(Cents per lb, f.o.b. mill, freight allowed Base quantity 30,000 lb)

Sheet and Plate: Ma, FSa, ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 12, 63¢-65¢; 14, 69¢-74¢; 16, 76¢-81¢; 18, 84¢-89¢; 20, 96¢-$1.01; 22, $1.22-$1.31; 24, $1.62-$1.75. Specification grade higher.

Extruded Round Rod: M, diam. in., ¼ to 0.311, 58¢; ½ to ¾, 46¢; 1¼ to 1.749, 43¢; 2½ to 5, 41¢. Other alloys higher.

Extruded Square, Hex. Bar: M, size across flats, in., ¼ to 0.311, 61¢; ½ to 0.749, 48¢; 1¼ to 1.749, 44¢; 2½ to 4, 42¢. Other alloys higher.

Extruded Solid Shapes, Rectangles: M, in weight per ft, for perimeters of less than size indicated, 0.10 to 0.11 lb. per ft, per. up to 3.5 in., 55¢; 0.22 to 0.25 lb per ft, per. up to 5.9 in., 51¢; 0.50 to 0.59 lb per ft, per. up to 8.6 in., 47¢; 1.8 to 2.59 lb per ft, per. up to 19.5 in., 44¢; 4 to 6 lb per ft, per. up to 28 in., 43¢. Other alloys higher.

Extruded Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to 5/16, $1.14; 5/16 to ⅜, $1.02; ½ to ⅝, 76¢; 1 to 2 in., 65¢; 0.065 to 0.082, ⅜ to 7/16, 85¢; ⅝ to ¾, 62¢; 1 to 2 in., 57¢. 0.165 to 0.219, ⅝ to ¾, 54.5¢; 1 to 2 in., 53¢; 3 to 4 in., 49¢. Other alloys higher.

Nickel and Monel

(Base prices, cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	60	47
Strip, cold-rolled	66	50
Rods and shapes		
Hot-rolled	56	45
Cold-drawn	56	45
Angles, hot-rolled	56	45
Plates	58	46
Seamless tubes	89	80
Shot and blocks	..	40

Copper, Brass, Bronze

(Cents per pound, freight prepaid on 200 lb)

	Sheets	Rods	Extruded Shapes
Copper	33.68	....	33.28
Copper, hot-rolled	....	29.53	....
Copper, drawn	....	30.78	....
Low brass	31.97	....	34.88*
Yellow brass	30.77	....	33.78*
Red brass	32.36	....	35.27*
Naval brass	35.75	29.81	31.06*
Leaded brass	....	25.32	....
Commercial bronze	33.28	....	35.94*
Manganese bronze	39.25	33.15	34.65
Phosphor bronze, 5 pct	52.72	....	....
Muntz metal	33.78	29.34	30.59
Everdur, Herculoy, Olympic, etc.	38.37	35.31	....
Nickel silver, 10 pct	41.40	43.74	43.72
Architecutral bronze	....	....	29.45

* Seamless tubing

Scrap Metals

Brass Mill Scrap

(Cents per pound; add ½¢ per lb for shipments of 20,000 to 40,000 lb; add 1¢ for more than 40,000 lb)

	Heavy	Turnings
Copper	17⅝	16⅞
Yellow brass	15	14¼
Red brass	19⅜	18⅝
Commercial bronze	19⅞	18⅝
Manganese bronze	17¾	16⅞
Leaded brass rod ends	17¾	

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery)

No. 1 copper, wire	13.50
No. 2 copper, wire	12.50
Light copper	11.50
Refinery brass	11.00*

* Dry copper content.

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to producer)

No. 1 copper, wire	13.50
No. 2 copper, wire	12.50
Light copper	11.50
No. 1 composition	10.00
No. 1 comp. turnings	9.50
Rolled brass	8.75
Brass pipe	9.25
Radiators	8.00
Heavy yellow brass	8.00
Aluminum	
Mixed old cast	8.50
Mixed old clips	8.50
Mixed turnings, dry	7.00
Pots and pans	8.50
Low copper	12.00

Dealers' Scrap

(Dealers' buying prices, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 heavy copper and wire	12¼—12½
No. 2 heavy copper and wire	11¼—11½
Light copper	10¼—10½
Auto radiators (unsweated)	6½— 6¾
No. 1 composition	8½— 8¾
No. 1 composition turnings	8¼— 8½
Clean red car boxes	7¾— 8
Cocks and faucets	7¾— 8
Mixed heavy yellow brass	6 — 6½
Old rolled brass	6½— 7
Brass pipe	8¼— 8½
New soft brass clippings	11 —11½
Brass rod ends	7 — 7½
No. 1 brass rod turnings	6 — 6½

Aluminum

Alum. pistons and struts	4 — 4¼
Aluminum crankcases	6 — 6½
2S aluminum clippings	10 —10½
Old sheet and utensils	6 — 6½
Borings and turnings	3 — 3½
Misc. cast aluminum	6 — 6½
Dural Clips (24S)	6 — 6½

Zinc

New zinc clippings	6½— 7
Old zinc	5 — 5½
Zinc routings	3½— 3¾
Old die cast scrap	3 — 3½

Nickel and Monel

Pure nickel clippings	18 —19
Clean nickel turnings	16 —17
Nickel anodes	18 —19
Nickel rod ends	18 —19
New Monel clippings	13½—14½
Clean Monel turnings	8 — 9
Old sheet Monel	10 —11
Old Monel castings	8 — 9
Inconel clippings	11 —12
Nickel silver clippings, mixed	7 — 7½
Nickel silver turnings, mixed	6 — 6½

Lead

Soft scrap lead	8½— 9
Battery plates (dry)	4¼— 4½

Magnesium Alloys

Segregated solids	8 — 9
Castings	4½— 5½

Miscellaneous

Block tin	77 —79
No. 1 pewter	58 —60
No. 1 auto babbitt	42 —44
Mixed common babbitt	10½—11
Solder joints	14 —15
Siphon tops	45 —47
Small foundry type	12½—13
Monotype	11½—12
Lino. and stereotype	11 —11½
Electrotype	8½— 9
New type shell cuttings	10 —10½
Hand picked type shells	5 — 5½
Lino. and stereo. dross	6½— 7
Electro. dross	4½— 5

Market Seen Firmer; Buying Still Light

New York

• • • **This week** the decline in the scrap market seems to have been arrested in some areas. Mills have not yet entered the market for any sizable purchases. Other consumers are not interested in making any commitments at today's prices.

For the first time in several months THE IRON AGE scrap composite advanced. It rose 17¢ per gross ton to $22.92 per gross ton. This figure is $20.08 per gross ton below the price at the first of the year. Prices for No. 1 heavy steel this week are: Pittsburgh, $23.50 to $24; Chicago, $22 to $24; and Philadelphia, $21.50 to $22.50.

This week some consumer buying tended to halt price declines. Some consumers are buying. It is still anyone's guess whether the downward spiral has come to a point where the market will tend to stabilize. High priced inventories are still being mentioned as the main reason for lack of consumer interest.

With declining inventories and lower scrap prices some sources feel confident that mills may resume buying within the next 60 days. With the low scrap prices in some areas there are indications that some dealers will not do any more collecting.

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PITTSBURGH—A substantial tonnage of railroad No. 1 heavy melting steel was sold here last week to deliver at $25.00 per gross ton. On this basis, and upon appraisal of other market factors the price of No. 1 heavy melting steel is quotable off $1.00 this week to $23.50 to $24.00. The railroad lists haven't been selling well, forcing the carriers to make individually negotiated sales. Short shoveling turnings were sold late last week at both $18.50 and $19.00 per gross ton delivered. Every item on the list was off this week as prices dropped to the point where large scrap firms are talking about beginning to stockpile material.

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CHICAGO—Chicago's desperate scrap market took on a tinge of mystery last week when Carnegie on Apr. 19 paid $2.00 over going prices for some scrap. The trade was puzzled as they are unaccustomed to philanthropy. Carnegie officials refused to divulge the tonnage. Some scrap men reported to THE IRON AGE that a few days previous they had offered No. 2 heavy melting and No. 2 bundles at the lower price and had been turned down. Others just rolled their eyes and declared "somebody is crazy". Carnegie denied they have received lower offers. Two large brokers reported they regarded the new tonnage, which must be shipped by Apr. 30, as overshipment allowances on old orders. Carnegie said no, this is a new order. Regardless of the reason for the maneuver it has momentarily firmed the market. The firming or stabilization may not last but at press time no later sales at lower prices could be found. Those who had feared the market might bounce after the record drops of February and March now believe the rebound possibilities are remote. The further skid of railroad specialties last week confirmed the opinion of some that the market is still weak despite the momentary strength in openhearth items.

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PHILADELPHIA—Resistance to lower scrap prices developed last week in this market when dealers lost interest in business at lower prices. A larger tonnage of bundles was placed than for many weeks and it was reported that there was some willingness to edge up the price if necessary to fill the order. Cast grades are holding their own. It is learned that there has been difficulty in filling the breakable tonnage at $28.00. Turnings prices eased off another $1.00. Low phos and specialties were inactive. Plans for stockpiling scrap were turned down by a subcommittee of the Iron and Steel Advisory Committee of the Munitions Board, causing some scrap producers to focus their attention on the possibility of exports.

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CLEVELAND—On appraisal, the scrap market here and in the Valley was weaker this week but there were signs that future price fluctuations will be in the 50¢ to $1 category. At press time, the prevailing sentiment in the trade was that the bottom of the market will certainly be probed during May, which will probably be the bargain basement of the present price break. Accelerated efforts to reduce inventory and the fact that one major consumer here will buy nothing during May have tended to neutralize the efforts of some consumers to artificially support a very weak market. All consumers are being very selective in the acceptance of material. Prices are not low enough yet to inspire brokers and dealers to put anything on the ground, but consumers of blast furnace grades have been increasing their consumption.

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CINCINNATI—Scrap consumers here were shifting their inventory reduction efforts into high gear this week in either anticipation of lower prices or lower operations or both. Both foundries and mills are reducing inventory. As a result, little scrap is moving, and the market is in such a state of complete inactivity that new price weaknesses develop slowly. At the same time, the artificial respiration administered the market in another district may have had a temporary but somewhat settling effect on prices of openhearth material here.

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DETROIT—The same uncertainty and indecision that has characterized the Detroit market for weeks continues as large mill buyers remain out of the market. Meanwhile, the largest tonnage of plant scrap yet offered in the free market during the postwar period is being sold this week. There is considerable speculation here as to the possible effect of this large tonnage, particularly in view of the fact that several prominent local scrap buyers here will undoubtedly refrain from bidding on the offerings.

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NEW YORK—This past week the scrap market showed the same uncertainty that has characterized it for some weeks. Prices of some items have stabilized around last week's level. There is little activity and still no new business to speak of. Consumers have been buying the cast grades and the quotation of $20 to $21 has held for the past 2 weeks. Boring and turnings were very weak and slipped up to $2.50 per gross ton.

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ST. LOUIS—The decline in scrap iron prices seems to have been temporarily halted as prices were unchanged in the St. Louis industrial district this week. Although the market is still weak, there was no buying by the mills during the week and shipments have been only against orders. Mills are well fortified with inventories.

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BOSTON—Orders are still scarce and quotations continue to be mere guesswork in most cases. No. 1 heavy melting is quoted from $14.50 to $15.00, a figure that many hope will be a bottom. Dealers don't want to talk about cast as the situation remains just as bad as it had been for several months.

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BIRMINGHAM—Scrap prices here have dropped again with No. 1 heavy melting steel down $2 per ton and cast grades tobogganing as much as $5. Current prices are based on the purchase of limited tonnages with cars bought as an accommodation about the only material moving. Reduced operations at pressure and soil pipe plants in this area have affected demand for cast. Receipts at dealers' yards are very light.

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BUFFALO—Sentiment was considerably improved this week as prices appeared to have leveled off for the time. Business was very quiet but pressure was light. Scattered inquiries for cast scrap were regarded as encouraging and some cast was reported sold to Canada at steady prices. Only worthwhile price change was $1.00 decline in low phos plate to $24.50 to $25.50. Consumer receipts of scrap by water were fairly heavy with the total by lake and canal so far in the young season about 30,000 tons.

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$23.50 to $24.00
R.R. hvy. melting	24.50 to 25.00
No. 2 hvy. melting	21.50 to 22.00
No. 2 bundles	19.50 to 20.00
RR. scrap rails	28.00 to 28.50
Rails 2 ft and under	33.50 to 34.00
No. 1 comp'd bundles	23.50 to 24.00
Hand bdld. new shts.	21.50 to 22.00
Hvy. steel forge turn.	21.00 to 21.50
Mach. shop turn.	15.00 to 15.50
Shoveling turn.	18.50 to 19.00
Mixed bor. and misc. turn.	15.00 to 15.50
Cast iron borings	18.00 to 18.50
No. 1 mach. cast.	29.00 to 30.00
Mixed yard cast.	23.00 to 23.50
Hvy. breakable cast.	24.00 to 24.50
Malleable	31.50 to 32.00
RR. knuck. and coup.	30.50 to 31.00
RR. coil springs	30.50 to 31.00
RR. leaf springs	30.50 to 31.00
Rolled steel wheels	30.50 to 31.00
Low phos.	25.50 to 26.00

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$22.00 to $24.00
No. 2 hvy. melting	20.00 to 22.00
No. 1 bundles	22.00 to 24.00
No. 2 dealers' bundles	18.00 to 20.00
Mach. shop turn.	10.00 to 12.00
Short shov. turn.	10.00 to 12.00
Cast iron borings	10.00 to 12.00
Mix. borings and turn.	10.00 to 12.00
Low phos. hvy. forge	25.00 to 26.00
Low phos. plates	23.00 to 24.00
No. 1 RR. hvy. melt.	24.00 to 24.50
Rerolling rails	27.00 to 28.00
Miscellaneous rails	24.00 to 25.00
Angles & splice bars	24.00 to 25.00
Locomotive tires, cut	28.00 to 30.00
Cut bolster & side frames	28.00 to 30.00
Standard stl. car axles	30.00 to 31.00
No. 3 steel wheels	25.00 to 26.00
Couplers and knuckles	24.00 to 25.00
Rails, 2 ft and under	29.00 to 30.00
Malleable	23.00 to 24.00
No. 1 mach. cast.	26.00 to 28.00
No. 1 agricul. cast.	24.00 to 26.00
Heavy breakable cast.	19.00 to 20.00
RR. grate bars	21.00 to 23.00
Cast iron brake shoes	18.00 to 19.00
Cast iron car wheels	28.00 to 30.00

CINCINNATI

Per gross ton, f.o.b. cars:

No. 1 hvy. melting	$20.00 to $21.00
No. 2 hvy. melting	19.00 to 20.00
No. 1 bundles	19.00 to 20.00
No. 2 bundles	17.00 to 18.00
Mach. shop turn.	9.00 to 10.00
Shoveling turn.	10.00 to 11.00
Cast iron borings	10.00 to 11.00
Mixed bor. & turn.	9.00 to 10.00
Low phos. 18 in. under	24.00 to 25.00
No. 1 cupola cast.	27.00 to 28.00
Hvy. breakable cast.	21.00 to 22.00
Rails 18 in. and under	33.50 to 34.50
Rails random length	23.00 to 24.00
Drop broken	31.00 to 32.00

BOSTON

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$14.50 to $15.00
No. 2 hvy. melting	13.00 to 13.50
No. 1 bundles	13.50 to 14.00
No. 2 bundles	13.00 to 13.50
Bushelings	12.50 to 13.50
Shoveling turn.	10.00 to 11.00
Machine shop turn.	7.00 to 8.00
Mixed bor. and turn.	7.00 to 8.00
Cl'n cast chem. bor.	12.00 to 16.00
No. 1 machinery cast.	25.00 to 28.00
No. 2 machinery cast.	24.00 to 26.00
Heavy breakable cast.	16.00 to 17.00
Stove plate	20.50 to 21.00

DETROIT

Per gross ton, brokers' buying prices f.o.b. cars:

No. 1 hvy. melting	$16.50 to $17.00
No. 2 hvy. melting	16.50 to 17.00
No. 1 bundles	16.50 to 17.00
New busheling	16.50 to 17.00
Flashings	16.50 to 17.00
Mach. shop turn.	10.00 to 11.00
Shoveling turn.	11.00 to 12.00
Cast iron borings	11.00 to 12.00
Mixed bor. & turn.	10.00 to 11.00
Low phos. plate	16.50 to 17.00
Heavy breakable cast.	13.00 to 17.00
Stove plate	16.00 to 17.00
Automotive cast.	23.00 to 25.00
No. 1 cupola cast.	19.00 to 23.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$21.50 to $22.50
No. 2 hvy. melting	19.00 to 20.00
No. 1 bundles	22.00 to 23.00
No. 2 bundles	17.00 to 18.00
Mach. shop turn.	14.00 to 15.00
Shoveling turn.	16.00 to 17.00
Mixed bor. and turn.	12.00 to 13.00
Clean cast chemical bor.	21.00 to 22.00
No. 1 machinery cast.	27.00 to 29.00
No. 1 mixed yard cast.	25.00 to 27.00
Hvy. breakable cast.	27.00 to 28.00
Hvy. axle forge turn.	21.50 to 22.50
Low phos. acid openhearth	25.00 to 26.00
Low phos. electric furnace	27.00 to 28.00
Low phos. bundles	23.00 to 24.00
RR. steel wheels	29.00 to 30.00
RR. coil springs	29.00 to 30.00
RR. malleable	24.00 to 28.00
Cast iron carwheels	29.00 to 30.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$21.00 to $24.00
No. 2 hvy. melting	19.00 to 20.00
No. 2 bundled sheets	19.00 to 20.00
Mach. shop turn.	14.00 to 15.00
Shoveling turnings	14.00 to 15.00
Locomotive tires, uncut	24.00 to 25.00
Mis. std. sec. rails	23.00 to 24.00
Steel angle bars	26.00 to 27.00
Rails 3 ft and under	32.00 to 33.00
RR. steel springs	24.00 to 25.00
Steel car axles	28.00 to 30.00
Brake shoes	21.00 to 22.00
Malleable	24.00 to 25.00
Cast iron car wheels	30.00 to 31.00
No. 1 machinery cast	31.00 to 32.00
Hvy. breakable cast.	20.00 to 21.00
Stove plate	24.00 to 25.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy melting	$20.00
No. 2 hvy. melting	20.00
No. 2 bundles	18.00
No. 1 busheling	20.00
Long turnings	14.00
Shoveling turnings	17.00
Cast iron borings	17.00
Bar crops and plate	$24.00 to 25.00
Structural and plate	24.00 to 25.00
No. 1 cupola cast.	29.00 to 30.00
Stove plate	30.00 to 31.00
No. 1 RR. hvy. melt.	22.00 to 23.00
Steel axles	30.00 to 32.00
Scrap rails	23.00
Rerolling rails	27.00
Angles & splice bars	26.00 to 28.00
Rails 3 ft & under	25.00 to 26.00
Cast iron carwheels	29.00 to 30.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$23.50 to $24.00
No. 2 hvy. melting	20.50 to 21.00
No. 1 bundles	23.50 to 24.00
No. 2 bundles	19.00 to 19.50
Mach. shop turn.	13.50 to 14.00
Short shov. turn.	18.50 to 19.00
Cast iron borings	18.50 to 19.00
Low phos.	24.50 to 25.00

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$15.00 to $16.00
No. 2 hvy. melting	13.00 to 14.00
No. 2 bundles	12.00 to 13.00
Mach. shop turn	7.50 to 8.00
Mixed bor. turn.	7.50 to 8.00
Shoveling turnings	9.50 to 10.00
Machinery cast.	22.00 to 23.00
Mixed yard cast.	20.00 to 21.00
Heavy breakable cast.	20.00 to 21.00
Charging box cast	20.00 to 21.00
Unstrp. motor blks.	16.00 to 17.00
Cl'n cast chem. bor.	16.00 to 19.00

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$23.50 to $24.50
No. 2 hvy. melting	20.50 to 21.50
No. 1 bundles	20.50 to 21.50
No. 2 bundles	18.50 to 19.50
No. 1 busheling	20.50 to 21.50
Mach. shop turn.	14.00 to 15.00
Shoveling turn.	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Mixed bor. and turn.	17.00 to 18.00
Cupola cast.	29.00 to 30.00
Mixed yard cast.	27.00 to 28.00
Stove plate	27.00 to 28.00
Small indus. malleable	22.00 to 23.00
Low phos. plate	24.50 to 25.50
Scrap rails	27.00 to 28.00
Rails 3 ft & under	32.00 to 33.00
RR. steel wheels	29.00 to 30.00
RR. coil & leaf spgs.	29.00 to 30.00
RR. knuckles & coup.	29.00 to 30.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$22.50 to $23.00
No. 2 hvy. melting	18.00 to 18.50
No. 1 bundles	22.50 to 23.00
No. 2 bundles	16.00 to 16.50
No. 1 busheling	22.50 to 23.00
Drop forge flashings	22.50 to 23.00
Mach. shop turn.	12.50 to 13.00
Shoveling turn.	18.50 to 19.00
Steel axle turn.	19.50 to 20.00
Cast iron borings	18.50 to 19.00
Mixed bor. & turn.	18.50 to 19.00
Low phos. 2 ft and under	23.50 to 24.00
No. 1 mach. cast.	29.00 to 30.00
Malleable	25.00 to 26.00
RR. cast.	30.00 to 31.00
Railroad grate bars	20.00 to 21.00
Stove plate	20.00 to 21.00
RR. hvy. melting	24.50 to 25.00
Rails 3 ft and under	35.00 to 36.00
Rails 18 in. and under	36.00 to 37.00

SAN FRANCISCO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00
No. 2 hvy. melting	18.00
No. 1 bales	16.00
No. 2 bales	16.00
No. 3 bales	13.00
Mach. shop turn.	12.00
Elec. fur. 1 ft under	30.00
No. 1 cupola cast.	$30.00 to 35.00
RR. hvy. melting	20.00
Rails	23.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00
No. 2 hvy. melting	18.00
No. 1 bales	16.00
No. 2 bales	16.00
No. 3 bales	13.00
Mach. shop turn.	12.00
Elec. fur. 1 ft under	30.00
No. 1 cupola cast.	$30.00 to 35.00
RR. hvy. melting	20.00

SEATTLE

Per gross ton delivered to consumer:

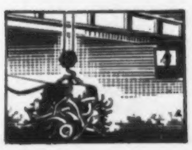
No. 1 & No. 2 hvy melt	$20.00
No. 1 & No. 2 bales	16.00
No. 3 bales	13.00
Elec. fur. 1 ft and under	30.00
No. 1 cupola cast.	$28.00 to 30.00
RR. hvy. melting	20.00

HAMILTON, ONT.

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point:

Heavy melting	$23.00*
No. 1 bundles	23.00*
No. 2 bundles	22.50*
Mechnical bundles	21.00*
Mixed steel scrap	19.00*
Mixed borings and turnings	17.00*
Rails, remelting	23.00*
Rails, rerolling	26.00*
Bushelings	17.50*
Bushelings, new fact, prop'd	21.00*
Bushelings, new fact, unprop'd	16.00*
Short steel turnings	17.00*
No. 1 cast.	$48.00 to 50.00*
No. 2 cast.	44.00 to 45.00*

*Ceiling Price.



Comparison of Prices . .

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Flat-Rolled Steel: (cents per pound)	Apr. 26, 1949	Apr. 19, 1949	Mar. 29, 1949	Apr. 27, 1948
Hot-rolled sheets	3.25	3.25	3.26	2.80
Cold-rolled sheets	4.00	4.00	4.00	3.55
Galvanized sheets (10 ga)	4.40	4.40	4.40	3.95
Hot-rolled strip	3.25	3.25	3.265	2.80
Cold-rolled strip	4.038	4.038	4.063	3.55
Plates	3.42	3.42	3.42	2.95
Plates wrought iron	7.85	7.85	7.85	7.25
Stains C-R strip (No. 302)	33.25	33.25	33.25	30.50
Tin and Terneplate: (dollars per base box)				
Tinplate (1.50 lb) cokes	$7.75	$7.75	$7.75	$6.80
Tinplate, electro (0.50 lb)	6.70	6.70	6.70	6.00
Special coated mfg. ternes	6.65	6.65	6.65	5.90
Bars and Shapes: (cents per pound)				
Merchant bars	3.35	3.35	3.35	2.90
Cold-finished bars	3.995	3.995	3.995	3.55
Alloy bars	3.75	3.75	3.75	3.30
Structural shapes	3.25	3.25	3.25	2.80
Stainless bars (No. 302)	28.50	28.50	28.50	26.00
Wrought iron bars	9.50	9.50	9.50	8.65
Wire: (cents per pound)				
Bright wire	4.15	4.15	4.15	3.55
Rails: (dollars per 100 lb)				
Heavy rails	$3.20	$3.20	$3.20	$2.75
Light rails	3.55	3.55	3.55	3.10
Semifinished Steel: (dollars per net ton)				
Rerolling billets	$52.00	$52.00	$52.00	$45.00
Slabs, rerolling	52.00	52.00	52.00	45.00
Forging billets	61.00	61.00	61.00	54.00
Alloy blooms, billets, slabs	63.00	63.00	63.00	66.00
Wire rod and Skelp: (cents per pound)				
Wire rods	3.40	3.40	3.463	2.80
Skelp	3.25	3.25	3.25	2.90

Pig Iron: (per gross ton)	Apr. 26, 1949	Apr. 19, 1949	Mar. 29, 1949	Apr. 27, 1948
No. 2, foundry, Phila.	$50.65	$50.56	$51.56	$44.61
No. 2, Valley furnace	46.50	46.50	46.50	39.50
No. 2, Southern Cin'ti*	49.47	49.47	49.47	43.28
No. 2, Birmingham	43.38	43.38	43.38	37.38
No. 2, foundry, Chicago†	46.50	46.50	46.50	39.00
Basic del'd Philadelphia*	49.81	49.81	50.76	44.11
Basic, Valley furnace	46.00	46.00	46.00	39.00
Malleable, Chicago†	46.50	46.50	46.50	39.50
Malleable, Valley	46.50	46.50	46.50	39.50
Charcoal, Chicago	73.78	73.78	73.78	62.46
Ferromanganese‡	161.40	161.40	161.40	145.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ Average of U. S. prices quoted on Ferroalloy page.
* Does not include interim increase on total freight charges, effective Jan. 11, 1949.

Scrap (per gross ton)	Apr. 26, 1949	Apr. 19, 1949	Mar. 29, 1949	Apr. 27, 1948
Heavy melt'g steel, P'gh.	*$23.75*	$24.75	$32.50	$40.25
Heavy melt'g steel, Phila.	22.00	22.00	29.50	41.50
Heavy melt'g steel, Ch'go	**23.00**	21.50	31.50	39.25
No. 1, hy. comp. sh't, Det.	16.75	16.75	28.50	35.50
Low phos. Young'n	24.75	24.75	34.50	45.25
No. 1, cast, Pittsburgh	*29.50*	33.50	39.00	64.00
No. 1, cast, Philadelphia	28.00	28.00	34.50	65.50
No. 1, cast, Chicago	*27.00*	29.50	38.00	74.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.50	$14.50	$14.50	$12.50
Foundry coke, prompt	16.50	16.50	16.50	14.00
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro, Conn.	21.50	21.50	23.50	21.50
Copper, Lake Conn.	23.625	23.625	23.625	21.625
Tin, Grade A, New York	$1.03	$1.03	$1.03	94.00
Zinc, East St. Louis	13.00	13.00	16.00	12.00
Lead, St. Louis	14.80	14.80	16.85	17.30
Aluminum, virgin	17.00	17.00	17.00	15.00
Nickel, electrolytic	42.93	42.93	42.93	36.56
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	38.50	38.50	38.50	33.00

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942, and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when shipments for this quarter are compiled.

Composite Prices . .

	FINISHED STEEL (Base Price)	PIG IRON	SCRAP STEEL
Apr. 26, 1949	3.74887¢ per lb.	$46.57 per gross ton	$22.92 per gross ton
One week ago	3.74887¢ per lb.	$46.57 per gross ton	$22.75 per gross ton
One month ago	3.75197¢ per lb.	$46.82 per gross ton	$31.17 per gross ton
One year ago	3.28244¢ per lb.	$40.11 per gross ton	$40.33 per gross ton

	Finished Steel HIGH	Finished Steel LOW	Pig Iron HIGH	Pig Iron LOW	Scrap Steel HIGH	Scrap Steel LOW
1949	3.76049¢ Jan. 1	3.74887¢ Apr. 12	$46.82 Jan. 4	$46.57 Apr. 19	$43.00 Jan. 1	$22.75 Apr. 19
1948	3.75700¢ July 27	3.22566¢ Jan. 1	46.91 Oct. 12	39.58 Jan. 6	43.16 July 27	39.75 Mar. 9
1947	3.19541¢ Oct. 7	2.87118¢ Jan. 7	37.98 Dec. 30	30.14 Jan. 7	42.58 Oct. 28	29.50 May 20
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1	30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1
1945	2.44104¢ Oct. 2	2.54490¢ Jan. 2	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢	2.29176¢	23.61	23.61	$19.17	$19.17
1942	2.28249¢	2.28249¢	23.61	23.61	19.17	19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. producing points in cents per pound unless otherwise indicated. Extras apply. (1) Commercial quality sheet grade; prices, 0.25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Cokes, 1.25 lb, deduct 25¢ per base box. (6) 18 gage and heavier. (7) For straight length material only from producers to fabricators. (8) Also shafting. For quantities of 40,000 lb and over. (9) Carload lot in manufacturing trade. (10) Hollowware enameling, gages 29 to 31 only. (11) Produced to dimensional tolerances in AISI Manual Sec. 6. (12) Slab prices subject to negotiation in most cases. (13) San Francisco only. (14) Los Angeles only. (15) San Francisco and Los Angeles only. (16) Seattle only. (17) Seattle and Los Angeles only.

PRODUCTS	Base prices at producing points apply to the sizes and grades produced in these areas														
	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio		Detroit	Johnstown	Seattle, S. Frisco, LosAngeles	Fontana
INGOTS Carbon forging	$50.00														
Alloy	$51.00						(per net ton)								
BILLETS, BLOOMS, SLABS Carbon, rerolling[12]	$52.00				$52.00	$52.00	(per net ton)						$52.00		
Carbon forging billets	$61.00	$61.00	$61.00	$61.00	$61.00	$61.00	(per net ton)						$61.00		
Alloy	$63.00	$63.00				$63.00	(Bethlehem, Canton, Massillon = $63.00) (per net ton)								
PIPE SKELP	3.25						3.25				Warren = 3.25				
WIRE RODS	3.40	3.40		3.40	3.40		3.40	3.50			Worcester 3.70		3.40	4.05[13] 4.20[14]	
SHEETS Hot-rolled[6]	3.25	3.25	3.25	3.25	3.25	3.25 (Consho	3.25 hocken,	3.25 Pa. 3.75)		Warren, Ashland = 3.25		3.45		3.95[15]	4.15
Cold-rolled[1]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.20	4.00	Warren 4.00	4.20		Pittsburg, Cal. 4.95	
Galvanized (10 gage)	4.40	4.40	4.40		4.40			4.40	Canton =4.40	4.40	Ashland =4.40			5.15[15]	
Enameling (12 gage)	4.40	4.40	4.40	4.40			4.40		4.60	4.40		4.70			
Long ternes[2] (10 gage)	4.80		4.80							4.80					
STRIP Hot-rolled[3]	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25		3.25	Warren = 3.25	3.45		4.00 to 4.25	4.65
Cold-rolled[4]	4.00	4.15		4.00		4.00	4.00	4.00		New Haven 4.50 Warren = 4.00 to 4.25		4.20 to 4.50			5.55
TINPLATE Cokes, 1.50 lb.[5] base box	$7.75	$7.75	$7.75		$7.85			$7.85	$7.95	Warren, Ohio =$7.75				Pittsburg, Cal. =$8.50	
Electrolytic 0.25, 0.50, 0.75 lb. box	Deduct $1.30, $1.05 and 75¢ respectively from 1.50 lb. coke base box price														
TERNES MFG., special coated	Deduct $1.10 from 1.50 lb. coke base box price														
BLACKPLATE CANMAKING 55 to 128 lb.	Deduct $2.00 from 1.50 lb. coke base box price														
BLACKPLATE, h.e., 29 ga.[10]	5.30	5.30	5.30					5.40		Warren, Ohio =5.30					
BARS Carbon Steel	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35		3.35	Canton =3.35	3.55	3.35	4.05 to 4.10	4.00
Reinforcing (billet)[7]	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35			Canton =3.35		3.35	4.05 to 4.10	4.00
Cold-finished[8]	3.95 to 4.00	4.00	4.00	4.00		4.00	4.00					4.30			
Alloy, hot-rolled	3.75	3.75	3.75			3.75	3.75	Bethlehem, Canton, Massillon=3.75				4.05	3.75	4.80[14]	4.75
Alloy cold-drawn	4.65	4.65	4.65	4.65		4.65	4.65	Massillon=4.65			Worcester 4.95				
PLATE Carbon steel[11]	3.40 to 3.60	3.40	3.40	3.40 to 3.60	3.40 Cons	3.45 hohocken	3.40 =3.55	3.45 Coatesville=3.50, Claymont=3.65 Geneva=3.40, Harrisburg=4.95				3.65	3.45	4.30[16]	5.30
Floor plates	4.55	4.55		4.55				Conshohocken=4.55							
Alloy	4.40	4.40							Coatesville=5.10						
SHAPES, Structural	3.25	3.25	3.25		3.25	3.30	Bethlehem=3.30, Geneva, Utah=3.25						3.30	3.85 to 4.30	3.80
MANUFACTURERS' WIRE[9] Bright	4.15	4.15		4.15	4.15		4.15	4.25	Duluth=4.15, Worcester=4.45				4.15	5.15[13]	
Spring (high carbon)	5.20	5.20		5.20				5.30	Worcester=5.50 New Haven, Trenton=5.50				5.20	Duluth= 5.20-6.15	
PILING, Steel sheet	4.05	4.05				4.05									

STAINLESS STEELS

Base prices, in cents per pound, f.o.b. producing point

	Chromium Nickel							Straight Chromium		
Product	301	302	303	304	316	321	347	410	416	430
Ingots, rerolling	12.75	13.50	15.00	15.50	22.75	18.25	20.00	11.25	13.75	11.50
Slabs, billets, rerolling	17.00	18.25	20.25	19.25	30.25	24.50	26.75	15.00	18.50	15.25
Forg. discs, die blocks, rings	30.50	30.50	33.00	32.00	49.00	36.50	41.00	24.50	25.00	25.00
Billets, forging	24.25	24.25	26.25	25.50	39.00	29.00	32.75	19.50	20.00	20.50
Bars, wire, structurals	28.50	28.50	31.00	30.00	46.00	34.00	38.50	23.00	23.50	23.50
Plates	32.00	32.00	34.00	34.00	50.50	39.50	44.00	26.00	26.50-27.00	26 50
Sheets	37.50	37.50	39.50	39.50	53.00	45.50	50.00	33.00	33.50	35.50
Strip, hot-rolled	24.25	25.75	30.00	27.75	46.00	34.58	38.75	21.25	28.00	21.75
Strip, cold-rolled	30.50	33.00	36.50	35.00	55.00	44.50	48.50	27.00	33.50	27.50

ELECTRODES

Cents per lb. f.o.b. plant, threaded electrodes with nipples, unboxed

Diameter in in.	Length in in.	
Graphite		
17, 18, 20	60, 72	16.00¢
8 to 16	48, 60, 72	16.50¢
7	48, 60	17.75¢
6	48, 60	19.00¢
4, 5	40	19.50¢
3	40	20.50¢
2½	24, 30	21.00¢
2	24, 30	23.00¢
Carbon		
40	100, 110	7.50¢
35	65, 110	7.50¢
30	65, 84, 110	7.50¢
24	72 to 104	7.50¢
17 to 20	84, 90	7.50¢
14	60, 72	8.00¢
10, 12	60	8.25¢
8	60	8.50¢

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	90.5¢
18	4	1	—	5	$1.42
18	4	2	—	—	$1.025
1.5	4	1.5	8	—	65¢
6	4	2	6	—	69.5¢

High-carbon-chromium	52¢
Oil hardened manganese	29¢
Special carbon	26.5¢
Extra carbon	22¢
Regular carbon	19¢

Warehouse prices on and east of Mississippi are 2½¢ per lb higher. West of Mississippi, 4½¢ higher.

ELECTRICAL SHEETS

24 gage, HR cut lengths, f.o.b. mill

	Cents per lb
Armature	5.45
Electrical	5.95
Motor	6.70
Dynamo	7.50
Transformer 72	8.05
Transformer 65	8.60 to 10.60
Transformer 58	9.30 to 11.30
Transformer 52	10.10

RAILS, TRACK SUPPLIES

F.o.b. mill

Standard rails, 100 lb and heavier, No. 1 quality, per 100 lb	$3.20†
Joint bars, 100 lb	4.25
Light rails (from billets) per 100 lb	3.55

	Base Price cents per lb
Track spikes	5.35
Axles	5.20
Screw spikes	8.00
Tie plates	4.05
Tie plates, Pittsburg, Calif.*	4.20
Track bolts, untreated	8.25
Track bolts, heat treated, to railroads	8.50

*Seattle, add 30¢.
†CF&I, $3.30.

C-R SPRING STEEL

Base per pound f.o.b. mill

0.26 to 0.40 carbon	4.00¢
0.41 to 0.60 carbon	5.50¢
0.61 to 0.80 carbon	6.10¢
0.81 to 1.05 carbon	8.05¢
1.06 to 1.35 carbon	10.35¢

Worcester, add 0.30¢.

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless clad		
No. 304, 20 pct, f.o.b.		
Coatesville, Pa.	*26.50	
Washington, Pa.	*26.50	*22.50
Claymont, Del.	*26.50	
Conshohocken, Pa.		*22.50
Nickel-clad		
10 pct f.o.b. Coatesville, Pa.	27.50	
Inconel-clad		
10 pct, f.o.b. Coatesville.	36.00	
Monel-clad		
10 pct, f.o.b. Coatesville.	29.00	
Aluminized steel sheets		
Hot dip, 20 gage, f.o.b. Butler, Pa.		9.25

* Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer, f.o.b. mill

	Base Column	Pittsburg, Calif.
Standard & coated nails*	103	123
Galvanized nails*	103	123
Woven wire fence†	109	132
Fence posts, carloads††	114	...
Single loop bale ties	106	130
Galvanized barbed wire**	123	143
Twisted barbless wire	123	...

* Pgh., Chi., Duluth; Worcester, 6 columns higher. † 15½ gage and heavier. ** On 80 rod spools, in carloads. †† Duluth only.

	Base per 100 lb	Pittsburg, Calif.
Annealed fence wire‡	$4.80	$5.75
Annealed, galv. fencing‡	5.25	6.20
Cut nails, carloads‡‡	6.75	...

‡ Add 30¢ at Worcester; 10¢ at Sparrows Pt.
‡‡ Less 20¢ to jobbers.

HIGH STRENGTH, LOW ALLOY STEELS

Mill base prices, cents per pound

Steel	Aldecor	Corten	Double Strength No. 1	Dyn-alloy	Hi Steel	Mayari R	Otis-coloy	Yoloy	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	Great Lakes Steel
Plates	5.20	5.20	5.20	5.30	5.20	5.30	5.20	5.20	5.65
Sheets									
Hot-rolled	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95	5.25
Cold-rolled	6.05	6.05	6.05	.....	6.05	6.05	6.05	6.05	6.35
Galvanized	.....	6.75	.....	.....	.....	6.75	.....	.....	.....
Strip									
Hot-rolled	4.95	4.95	4.95	....	4.95	4.95	4.95	4.95	5.25
Cold-rolled	.....	.....	6.05	.....	.....	6.05	6.05	6.05	6.35
Shapes	.....	4.95	.....	.....	4.95	5.05	4.95	4.95	.....
Beams	.....	4.95	.....	.....	.....	.....	.....	.....	.....
Bars									
Hot-rolled	5.10	5.10	5.10	.....	5.10	5.10	5.10	5.10	5.40
Bar shapes	.....	5.10	.....	.....	5.10	5.10	5.10	5.10	.....

PIPE AND TUBING

Base discounts, f.o.b. mills, Base price, $200.00 per net ton.

STANDARD, THREADED AND COUPLED

Steel, buttweld	Black	Galv.
½-in.	43 to 41	24½ to 22½
¾-in.	46 to 44	28½ to 26½
1-in.	48½ to 46½	31½ to 29½
1¼-in.	49 to 47	32 to 30
1½-in.	49½ to 47½	32½ to 30½
2-in.	50 to 48	33 to 31
2½ to 3-in.	50½ to 48½	33½ to 31½
Steel, lapweld		
2-in.	39½	24 to 22
2½ to 3-in.	43½ to 42½	26 to 25
3½ to 6-in.	46½ to 42½	29 to 25
Steel, seamless		
2-in.	38½ to 27	21 to 9½
2½ to 3-in.	41½ to 32½	24 to 15
3½ to 6-in.	43½ to 38½	26 to 21
Wrought Iron, buttweld		
½-in.	+20½	+48
¾-in.	+10½	+37
1 & 1¼ in.	+ 4½	+28
2-in.	— 1½	+24½
3-in.	— 2	+24
Wrought Iron, lapweld		
2-in.	+ 7½	+32
2½ to 3½-in.	+ 5	+27½
4-in.	list	+21½
4½ to 8-in.	+ 2	+23

EXTRA STRONG, PLAIN ENDS

Steel, buttweld		
½-in.	42 to 40	25 to 23
¾-in.	46 to 44	29 to 27
1-in.	48 to 46	32 to 30
1¼-in.	48½ to 46½	32½ to 30½
1½-in.	49 to 47	33 to 31
2-in.	49½ to 47½	33½ to 32½
2½ to 3-in.	50 to 48	34 to 32
Steel, lapweld		
2-in.	39½ to 38½	23 to 22
2½ to 3-in.	44½ to 42½	28 to 26
3½ to 6-in.	48 to 44	31½ to 29½
Steel, seamless		
2-in.	37½ to 32½	21 to 16
2½ to 3-in.	41½ to 36½	25 to 21
3½ to 6-in.	45	28½
Wrought Iron, buttweld		
½-in.	+16	+42
¾-in.	+ 9½	+35
1 to 2-in.	— 1½	+24
Wrought Iron, lapweld		
2-in.	+ 4½	+28½
2½ to 4-in.	— 5	+17
4½ to 6-in.	— 1	+21½

For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Prices per 100 ft at mill in carload lots, cut length 4 to 24 ft inclusive.

OD in in.	Gage BWG	Seamless H.R.	Seamless C.R.	Electric Weld H.R.	Electric Weld C.D.
2	13	19.18	22.56	18.60	21.89
2½	12	25.79	30.33	25.02	29.41
3	12	28.68	33.76	27.82	32.74
3½	11	35.85	42.20	34.78	40.94
4	10	44.51	52.35	43.17	50.78

CAST IRON WATER PIPE

Per net ton

6 to 24-in., del'd Chicago $99.70
6 to 24-in., del'd N. Y. ... 96.50 to 101.40
6 to 24-in., Birmingham 86.50
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles, for all rail shipment; rail and water shipment less 113.30

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b. mill Pittsburgh, Cleveland, Birmingham or Chicago)

Base discount less case lots

Machine and Carriage Bolts

	Pct Off List
½ in. & smaller x 6 in. & shorter	35
9/16 & ⅝ in. x 6 in. & shorter	37
¾ in. & larger x 6 in. & shorter	34
All diam, longer than 6 in.	30
Lag, all diam over 6 in. longer	35
Lag, all diam x 6 in. & shorter	37
Plow bolts	47

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	35
9/16 to 1 in. inclusive	34
1⅛ to 1½ in. inclusive	32
1⅝ in. and larger	27

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifinished Hexagon Nuts

	USS	SAE
7/16 in. and smaller	..	41
½ in. and smaller	38	..
½ in. through 1 in.	..	39
9/16 in. through 1 in.	37	
1⅛ in. through 1½ in.	35	37
1⅝ in. and larger	28	..

In full case lots, 15 pct additional discount.

Stove Bolts

Packages, nuts separate $61.75
In bulk 70.00

Large Rivets

(½ in. and larger) Base per 100 lb

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $6.75
F.o.b. Lebanon, Pa. 6.75

Small Rivets

(7/16 in. and smaller) Pct off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham 48

Cap and Set Screws

(In packages) *Pct Off List*

Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright	46
¾ to 1 in. x 6 in., SAE (1035), heat treated	35
Milled studs	19
Flat head cap screws, listed sizes	5
Fillister head cap, listed sizes	28

FLUORSPAR

Washed gravel fluorspar, f.o.b. cars, Rosiclare, Ill.

Effective CaF_2 Content:	Base price per net ton
70% or more	$37.00
60% or less	34.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer	$7.60
Old range, nonbessemer	7.45
Mesabi, bessemer	7.35
Mesabi, nonbessemer	7.20
High phosphorus	7.20

After Dec. 31, 1948, increases or decreases in Upper Lake freight, dock and handling charges and taxes thereon to be for the buyers' account.

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.i.f. New York, ocean bags	7.9¢ to 9.0¢
Domestic sponge iron, 98+% Fe, carload lots	9.0¢ to 15.0¢
Electrolytic iron, annealed, 99.5+% Fe	31.5¢ to 39.5¢
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe	48.5¢
Hydrogen reduced iron, minus 300 mesh, 98+% Fe	63.0¢ to 80.0¢
Carbonyl iron, size 5 to 10 microns, 98%, 99.8%+ Fe	90.0¢ to $1.75
Aluminum	31.00¢
Antimony	51.17¢
Brass, 10 ton lots	27.25 to 37.25¢
Copper, electrolytic	33.625¢
Copper, reduced	34.35¢
Cadmium	$2.40
Chromium, electrolytic, 99% min.	$3.50
Lead	23.00¢
Manganese	60.00¢
Molybdenum, 99%	$2.65
Nickel, unannealed	67.00¢
Nickel, spherical, minus 30 mesh, unannealed	68.00¢
Silicon	34.00¢
Solder powder	8.5¢ plus metal cost
Stainless steel, 302	75.0¢
Tin	$1.155
Tungsten, 99%	$2.90
Zinc, 10 ton lots	16.25 to 17.75

COKE

	Net Ton
Furnace, beehive (f.o.b. oven) Connellsville, Pa.	$14.00 to $15.00
Foundry, beehive (f.o.b. oven) Connellsville, Pa.	$16.00 to $17.00
Foundry, Byproduct	
Buffalo, del'd	$22.95
Chicago, f.o.b.	20.40
Detroit, f.o.b.	19.40
New England, del'd	22.70
Seaboard, N. J., f.o.b.	22.00
Philadelphia, f.o.b.	20.45
Swedeland, Pa., f.o.b.	20.40
Painesville, Ohio, f.o.b.	20.90
Erie, del'd	$21.50 to 23.50
Cleveland, del'd	22.45
Cincinnati, del'd	21.50
St. Paul, f.o.b.	23.50
St. Louis, del'd	20.98
Birmingham, del'd	18.66

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Carloads, Per 1000
First quality, Pa., Md., Ky., Mo., Ill. (except Salina, Pa., add $5)	$80.00
No. 1 Ohio	74.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	74.00
No. 2 Ohio	66.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50)	11.50

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$80.00
Childs, Pa.	84.00
Hays, Pa.	85.00
Chicago District	89.00
Western, Utah and Calif.	95.00
Super Duty, Hays, Pa., Athens, Tex.	85.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	$13.75 to 14.00
Silica cement, net ton, bulk, Hays, Pa.	16.00
Silica cement, net ton, bulk, Ensley, Ala.	15.00
Silica cement, net ton, bulk, Chicago District	14.75
Silica cement, net ton, bulk, Utah and Calif.	21.00

Chrome Brick

	Per Net Ton
Standard chemically bonded, Balt., Chester	$69.00

Magnesite Brick

Standard, Balt. and Chester	$91.00
Chemically bonded, Balt. and Chester	80.00

Grain Magnesite

Std. ⅝-in. grains

Domestic, f.o.b. Balt. and Chester, in bulk, fines removed	$56.50
Domestic, f.o.b. Chewelah, Wash., in bulk with fines	$30.50 to 31.00
in sacks with fines	35.00 to 35.50

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk. Midwest, add 10¢; Missouri Valley, add 20¢ .. $12.[illegible]

WAREHOUSE PRICES

Base prices, f.o.b. warehouse, dollars per 100 lb. (Metropolitan area delivery, add 15¢ to base price except Cincinnati and New Orleans (*), add 10¢; New York, add 20¢.)

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Baltimore	5.31	6.21-6.41	6.95-7.11	5.37	....	5.56	5.36	5.42	6.16	....	10.10	....	....
Birmingham	5.05	....	6.45	5.05	6.68	5.25	5.00	5.00	6.68	....	....	....	....
Boston	5.55	6.45-6.75	7.71-7.85	5.65-5.95	6.75	5.80	5.42	5.52	6.27	9.64-9.82	10.04-10.07	11.23-11.27	11.47-11.52
Buffalo	.85	5.00-5.75	7.26-7.70	5.29-5.65	6.35-7.27	5.35	5.10	5.05-5.15	.90	9.70-9.73	9.95-9.98	11.15-11.18	11.40-11.43
Chicago	4.85	5.75	7.10	4.85	6.68	.10	.90	4.90	5.70	9.35-9.50	9.60-9.75	10.80-10.90	11.05-11.15
Cincinnati	5.16-5.28*	6.13*-6.18	7.53	5.28*-5.55	....	5.53*-5.63	5.40*-5.48	5.33*-5.55	.09*-6.10	9.74	9.99	11.19	11.44
Cleveland	4.98-5.18	5.75-6.06	7.20-7.46	5.03-5.15	....	5.37-5.54	5.16-5.47	5.17-5.34	5.90-5.97	9.49-9.66	9.74-9.91	10.95-11.07	11.19-11.32
Detroit	5.28-5.32	6.07-6.18	7.53-7.58	5.28-5.47	6.27-6.58	5.53-5.57	5.40	5.33-5.55	6.01-6.10	9.69-9.82	9.94-10.07	11.11-11.14	11.35-11.39
Houston	6.50-6.70	....	8.50	7.00	....	6.70	6.55	6.65	7.60	10.30	10.25	11.45	11.70
Indianapolis	5.15	6.05	7.39	5.15	6.25	5.40	5.20	5.35	6.50	....	....	....	....
Los Angeles	6.45-6.60	7.90-8.05	8.75-8.90	6.65-6.80	9.35[5]	6.15	5.95-6.10	6.10-6.25	7.95[14]-9.35	10.90-11.60	10.85-11.55	12.40-12.95	12.65-13.20
Memphis	5.75	6.60	....	5.95	6.80	5.95	5.75	5.75	6.50	....	....	....	....
Milwaukee	5.03	5.93	7.28	5.38	6.86	5.28	5.08	.08	5.87-5.88	9.53	9.78	10.98	11.23
New Orleans	5.95*	6.75*	....	6.15*	....	6.15*	5.95*	5.95*	6.65*	....	....	....	....
New York	5.40-5.61	6.46	7.71-7.86	5.62-5.98	....	5.70-6.00	5.33-5.61	5.57-5.80	6.41-6.61	9.73-9.93	9.98-10.18	11.18-11.38	11.43-11.63
Norfolk	5.80	....	....	6.05	....	6.05	6.05	6.05	7.05	....	....	....	....
Omaha	5.98	....	9.89	5.98	....	6.23	6.03	6.03	6.83	....	....	....	....
Philadelphia	5.32	6.49	7.48-7.58	5.60	6.69	5.53	5.25	5.55	6.34	9.64-9.69	9.89	10.94	11.19
Pittsburgh	4.85	5.75[1]	7.15	5.00	6.00	5.05	4.90	4.90	5.65	9.35	9.60	10.80	11.05-11.30
Portland	6.50[8]-6.60	8.00[1]	8.80-9.20	6.85[8]	....	6.30[8]	6.35[8]	6.35[8]	8.25[14]	10.50[6]	10.10[6]	....	....
Salt Lake City	7.05-8.00	8.20	7.90-9.06	7.10-7.70	....	5.75-6.85	6.65-7.00	6.95-7.25	7.40 7.55-	....	....	....	....
San Francisco	6.15[8]	7.50[2]	8.10[2]	6.75[8]	8.25[5]	6.35[4]	5.90[8]	5.90[8]	7.55	10.90[15]	10.85[15]	12.40[15]	12.65[15]
Seattle	6.20[4]-7.10[4]	7.75[2]-8.65[2]	7.65-9.15[2]	6.55[4]-6.70[4]	....	6.20-6.35[4]	6.15-6.30[4]	6.05[4]-6.20[4]	8.00[14]-8.15[14]	....	10.30[15]-11.35[15]	....	12.00[15]-14.10[15]
St. Louis	5.21-5.37	6.12-6.27	7.47-7.52	5.22-5.97	8.68	5.47-5.62	5.27-5.42	5.27-5.92	6.07-6.22	9.72	9.97	....	11.42
St. Paul	5.44	6.19-6.34	7.74	5.44	6.82	5.64-6.69	5.49	5.49	6.29	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED:

Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED:

Sheets, 400 to 1999 lb; strip, extras on all quantities bars 1000 lb and over.

ALLOY BARS:

1000 to 1999 lb.

GALVANIZED SHEETS:

450 to 1499 lb.

EXCEPTIONS:

(1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 500 to 1999 lb; (10) 500 to 999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over; (17) up to 1999 lb; (18) 1000 to 1499 lb.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight nor the 6 pct increase on total freight charges in the Eastern Zone (5 pct Southern Zone, 4 pct Western Zone), effective Jan. 11, 1949.

PRODUCING POINT PRICES

Producing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	48.00	.....	.....	.....	.....
Birmingham	42.88	43.38	.....	.....	.....
Buffalo	46.00	46.50	47.00	.....	.....
Chicago	46.00	46.50	46.50	47.00	.....
Cleveland	46.00	46.50	46.50	47.00	51.00
Duluth	46.00	46.50	46.50	47.00	.....
Erie	46.00	46.50	46.50	47.00	.....
Everett	.....	52.50	53.00	.....	.....
Granite City	47.90	48.40	48.90	.....	.....
Ironton, Utah	46.00-47.00	46.50-47.50	.....	.....	.....
Lone Star, Texas	46.00	46.50†	.....	.....	.....
Neville Island	46.00	46.50	46.50	.....	.....
Geneva, Utah	46.00	46.50	.....	.....	.....
Sharpsville	46.00	46.50	46.50	47.00	.....
Steelton	48.00	48.50	49.00	49.50	54.00
Struthers, Ohio	46.00	.....	.....	.....	.....
Swedeland	48.00	48.50	49.00	49.50	.....
Toledo	46.00	46.50	46.50	47.00	.....
Troy, N. Y.	.....	.....	.....	.....	54.00
Youngstown	46.00	46.50	46.50	.....	.....

DELIVERED PRICES (BASE GRADES)

Consuming Point	Producing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$0.50 Arb.	.....	53.00	53.50	.....	.....
Boston	Steelton	6.27	54.27	54.77	55.27	55.77	60.27
Brooklyn	Steelton	5.48	.....	53.98	54.48	54.98	59.48
Cincinnati	Birmingham	6.09	48.97	49.46	.....	.....	.....
Jersey City	Steelton	3.67	.....	52.17	52.67	53.17	57.67
Los Angeles	Geneva-Ironton	7.13	53.13-54.13	53.63-54.63	.....	.....	.....
Mansfield	Cleveland-Toledo	3.03	49.03	49.53	49.53	50.03	54.03
Philadelphia	Bethlehem	2.17	50.17	.....	.....	.....	.....
Philadelphia	Swedeland	1.31	49.31	49.81	50.31	50.81	.....
Philadelphia	Steelton	2.81	50.81	51.31	51.81	52.31	56.81
San Francisco	Geneva-Ironton	7.13	53.13-54.13	53.63-54.63	.....	.....	.....
Seattle	Geneva-Ironton	7.13	53.13-54.13	53.63-54.63	.....	.....	.....
St. Louis	Granite City	0.75 Arb.	48.65	49.15	49.65	.....	.....
Gulf Ports	Lone Star, Texas	.....	50.50	51.00†			

† Low Phos, Southern Grade

Producing point prices are subject to switching charges; silicon differential (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct for foundry iron); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.01 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio —$59.50; f.o.b. Buffalo, $60.75. Add $1.25 per ton for each additional 0.50 pct Si up to 17 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorus $66.00 per gross ton, f.o.b. Lyles, Tenn. Delivered Chicago, $73.78. High phosphorus charcoal pig iron is not being produced.

Ferromanganese

78-82% Mn, Maximum contract base price, gross ton, lump size.

F.o.b. Birmingham	$174
F.o.b. Niagara Falls, Alloy, W. Va., Welland, Ont.	$172
F.o.b. Johnstown, Pa.	$174
F.o.b. Sheridan, Pa.	$172
F.o.b. Etna, Pa.	$175

$2.00 for each 1% above 82% Mn; penalty, $2.00 for each 1% below 78%.

Briquets—Cents per pound of briquet, delivered, 66% contained Mn.

Carload, bulk	10.45
Ton lots	12.05
Less ton lots	12.95

Spiegeleisen

Contract prices gross ton, lump, f.o.b.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Palmerton, Pa.	$64.00	$65.00
Pgh. or Chicago	65.00	66.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.

96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, packed	35.5
Ton lots	37.0

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	28
Ton lots	30
Less ton lots	32

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, delivered.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	25.25	27.10	28.30
0.10% max. C	24.75	26.60	27.80
0.15% max. C	24.25	26.10	27.30
0.30% max. C	23.75	25.60	26.80
0.50% max. C	23.25	25.10	26.30
0.75% max. C, 7.00% max. Si	20.25	22.10	23.30

Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C. For 2% max. C, deduct 0.2¢.

Carload bulk	8.95
Ton lots	10.60
Briquet, contract basis, carlots, bulk delivered, per lb of briquet	10.30
Ton lots	11.90
Less ton lots	12.80

Silvery Iron, (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, openhearth $84.00, foundry, $85.00; $78.50 f.o.b. Niagara Falls; Electric furnace silvery iron is not being produced at Jackson. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 for each 0.50 pct. Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, for ton lots packed.

96% Si, 2% Fe	20.70
97% Si, 1% Fe	21.10

Silicon Briquets

Contract price, cents per pound of briquet, bulk, delivered, 40% Si, 1 lb Si briquets.

Carload, bulk	6.30
Ton lots	7.90
Less ton lots	8.80

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size, bulk, in carloads, delivered.

25% Si	18.50
50% Si	11.30
75% Si	13.50
85% Si	14.65
90-95% Si	16.50

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots	2.40	3.30	4.55

Ferrochrome

Contract prices, cents per pound, contained Cr, lump size, bulk, in carloads, delivered. (65-72% Cr, 2% max. Si)

0.06% C	28.75
0.10% C	28.25
0.15% C	28.00
0.20% C	27.75
0.50% C	27.50
1.00% C	27.25
2.00% C	27.00
65-69% Cr, 4-9% C	20.50
62-66% Cr, 4-6% C, 6-9% Si	21.35

Briquets — Contract price, cents per pound of briquet, delivered, 60% chromium.

Carload, bulk	13.75
Ton lots	15.25
Less ton lots	16.15

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 5¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, delivered.

High carbon type: 60.65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

Carloads	21.60
Ton lots	23.75
Less ton lots	25.25

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

Carloads	27.75
Ton lots	30.05
Less ton lots	31.85

Chromium Metal

Contract prices, cents per lb chromium contained packed, delivered, ton lots. 97% min. Cr, 1% max. Fe.

0.20% max. C	1.09
0.50% max. C	1.05
9.00% min. C	1.04

Calcium—Silicon

Contract price per lb of alloy, lump, delivered.

30-33% Ca, 60.65% Si, 3.00% max. Fe.

Carloads	17.90
Ton lots	21.00
Less ton lots	22.50

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	19.25
Ton lots	21.55
Less ton lots	22.55

CMSZ

Contract price, cents per pound of alloy, delivered.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

Ton lots	19.75
Less ton lots	21.00

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. V-5: 38-42% Cr, 17-19% Si, 8-11% Mn.

Ton lots	15.75¢
Less ton lots	17.00¢

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Ton lots and carload packed	18.00¢
Less ton lots	19.50¢

SMZ

Contract price, cents per pound of alloy, delivered. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

Ton lots	17.25
Less ton lots	18.50

Other Ferroalloys

Ferrotungsten, standard, lump or ¼ x down, packed, per pound contained W, 5 ton lots, delivered	$2.25
Ferrovanadium, 35-55%, contract basis, delivered, per pound, contained, V.	
Openhearth	$2.90
Crucible	3.00
High speed steel (Primos)	3.10
Vanadium pentoxide, 88-92% V_2O_5 contract basis, per pound contained V_2O_5	$1.20
Ferrocolumbium, 50-60% contract basis, delivered, per pound contained Cb.	
Ton lots	$2.90
Less ton lots	2.95
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Pa., per pound contained Mo.	$1.10
Calcium molybdate, 45-50%, f.o.b. Langeloth, Pa., per pound contained Mo.	96¢
Molybdenum oxide briquets, f.o.b. Langeloth, Pa.; bags, f.o.b. Wash., Pa., per pound contained Mo.	95¢
Ferrotitanium, 40%, regular grade, 10% C max., f.o.b. Niagara Falls, N. Y., freight allowed east of Mississippi and north of Baltimore, ton lots, per lb contained Ti	$1.28
Ferrotitanium, 25%, low carbon, f.o.b. Niagara Falls, N. Y., freight allowed east of Mississippi and north of Baltimore, ton lots, per lb contained Ti	$1.40
Less ton lots	1.45
Ferrotitanium, 15 to 19%, high carbon, f.o.b. Niagara Falls, N. Y., freight allowed east of Mississippi and north of Baltimore, carloads, per net ton	$160.00
Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. Siglo, Mt. Pleasant, Tenn., $3 unitage, per gross ton	$65.00
10 tons to less carload	75.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Ton lots	21.00¢
Zirconium, 12-15%, contract basis, lump, delivered, per pound of alloy.	
Carload, bulk	6.60¢
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.	
Carload	8.15¢
Ton lots	9.55¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Carload, bulk	11.00¢
Ton lots, packed	11.25¢
Less ton lots	11.75¢

Boron Agents

Contract prices per lb. of alloy, delivered.

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D. Ton lot	$1.20
F.o.b. Wash., Pa.; 100 lb. and over	
10 to 14% B.	.75
14 to 19% B.	1.20
19% min. B.	1.50
Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, delivered.	
Ton lots	$1.67
Less ton lots	1.79
Nickel—Boron 15-18% B, 1.00% max. Al. 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, delivered.	
Less ton lots	$1.80
Silcaz, contract basis, delivered.	
Ton lots	45.00¢
Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over.	
No. 1	93¢
No. 6	63¢
No. 79	45¢
Bortam, f.o.b. Niagara Falls	
Ton lots, per pound	45¢
Less ton lots, per pound	50¢
Carbortam, f.o.b. Suspension Bridge, N. Y.; freight allowed, Ti 15-18%, B 1.00-1.50%, Si 2.5-3.0%, Al 1.0-2.0%.	
Ton lots, per pound	8.625¢
Borosil, f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B	$6.25

FEATURE CONTINUATION

(*Continued from page 153*)

(28f) In tin alloys:

Dissolve in HCl plus minimum H_2O_2. Add hydroxylamine hydrochloride and complete as in (28).

SILVER

(29) In cadmium alloys:

Dissolve in HNO_3. Boil out nitrogen oxides. Add acetone solution of p-dimethylaminobenzalrhodanine. Add HCl. Red color forms. Determine Ag.

Interfering elements: Au, Pt, Pd.

References:

Schoonover, I. C.; J. Research, Nat. Bur. Stand., 15,377 (1935).

Silverman, L.; Anal. Chem., 20,906 (1948).

(29a) In lead base alloys:

Proceed as in (29), but filter off tin oxide.

(29b) In tin alloys:

Add ZnO, HCl, HBr and $HClO_4$. Volatilize As, Sb, Sn. Dilute. Complete as in (29).

IRON, ALUMINUM AND NICKEL

(30) In copper alloys:

Dissolve in HNO_3. Filter Sn. Electroplate Cu and Pb. Aliquot for Al as in (1) and (1g), Fe as in (28) and Ni as in (17). A rapid routine method.

References:

Goodman, W. B.; Thesis, Univ. of Pittsburgh, 1945.

TELLURIUM

(31) In copper alloys:

Dissolve in HNO_3. Filter insolubles. Fume with H_2SO_4. Dilute. Precipitate Te with hydrazine hydrochloride and $SnCl_2$. Dissolve in HNO_3 and evaporate. Dissolve in HCl. Produce Te with gum arabic and $SnCl_2$. Determine Te at 420 $M\mu$.

Interfering elements: Se.

References:

De Melo, R. H.; Anal. Chem., 20,488 (1948).

(31a) In lead and tin base alloys:

Dissolve in HCl plus H_2O_2. Precipitate Te as in (31) and wash out $PbCl_2$. Complete as in (31).

Expands Foundry Facilities

Salt Lake City

• • • **Ludin & May Foundry** Co., Inc., will start this week on a \$70,000 expansion of its fountry division here. The new unit will house equipment for molding and casting gray iron. The added facilities are expected to be in operation by fall.